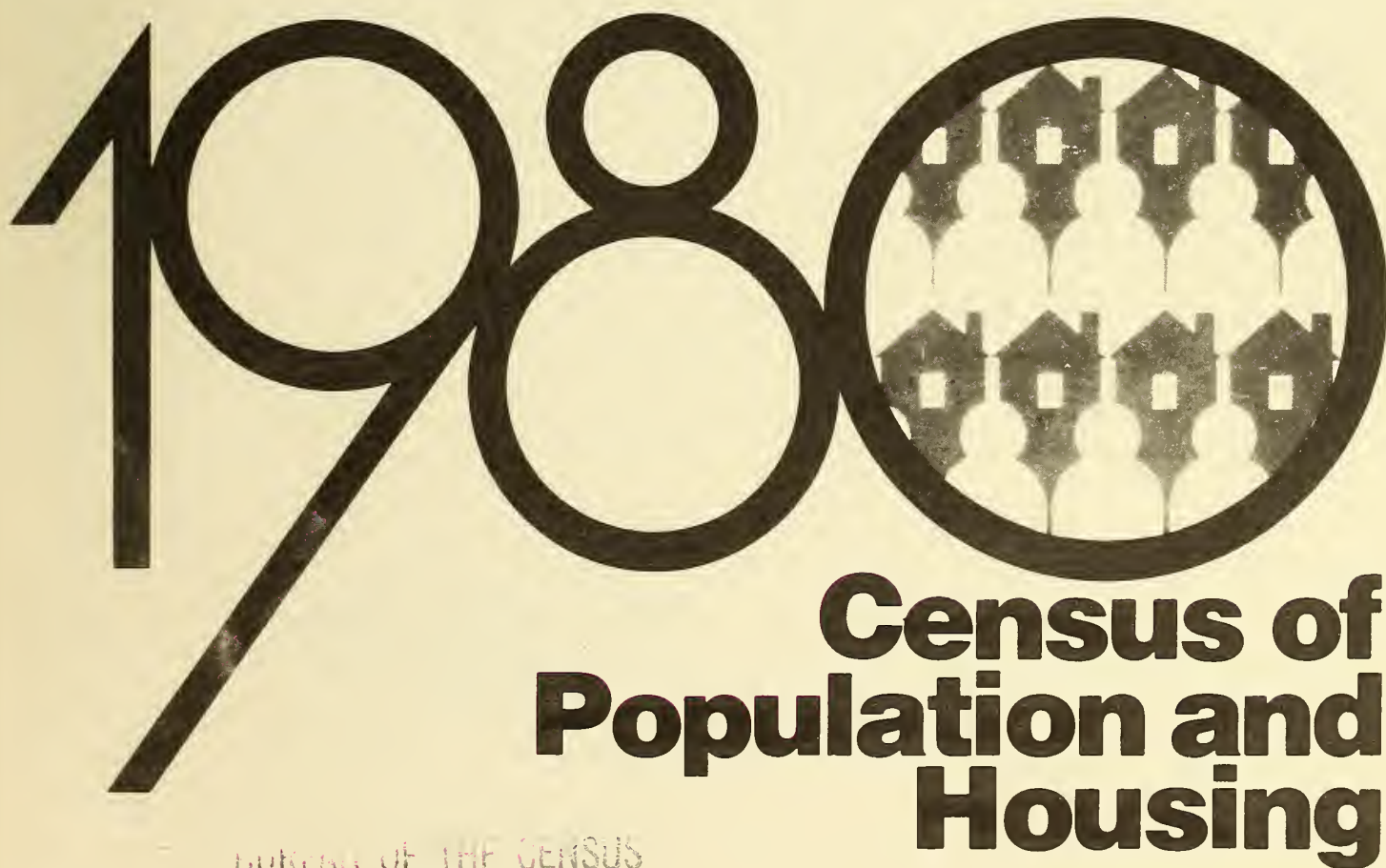


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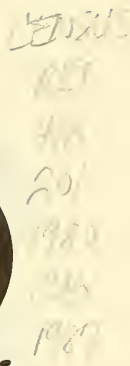
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Arthur F. Young, Chief

Acknowledgments

Many persons participated in the diverse activities of the 1980 census. These acknowledgments generally reflect staffs during the post-census data publication process. The Bureau was guided by Director **John G. Keane**, and Deputy Director **C. Louis Kincannon**. Primary direction of the publication program was performed by **William P. Butz**, Associate Director for Demographic Fields; assisted by **Peter A. Bounpane**, Assistant Director for Demographic Censuses; in conjunction with **Barbara A. Bailar**, Associate Director for Statistical Standards and Methodology; **Bryant Benton**, Associate Director for Administration and Management Services; and **Roland H. Moore**, Associate Director for Field Operations. The Director's staff was assisted by **Sherry L. Courtland**.

Responsibility for the overall planning, coordinating, processing, and publication of the 1980 census was in the Decennial Census Division under the direction of **Marshall L. Turner, Jr.**, Acting Chief, assisted by **Rachel F. Brown**, **Charles H. Hancock**, and **Roger O. Lepage**, Assistant Division Chiefs.

This report was planned in the Statistical Methods Division by **John H. Thompson**, Chief, Census Evaluation Branch under the general supervision of **Charles D. Jones**, Division Chief; **Susan M. Miskura**, then Assistant Chief for

Census Programs; and **James L. Dinwiddie**, Assistant Chief for Census Programs. Important contributions were made by **Kathryn F. Thomas**, **David C. Whitford**, **Milton C. Fan**, **Martha L. Sutt**, **Thomas W. Harahush**, **Robert F. O'Brien**, **Catherine E. Keeley**, **George A. Sledge**, **Marjorie A. Lueck**, **Karen V. O'Connor**, **Norman J. Johnson**, **Kenneth R. Sausman**, **Katherine A. Ockay**, **Charles D. Cowan**, and **Jeanne E. Washington**.

Computer programming and data processing support for this report was provided by **Donald R. Dalzell**, **William L. Peil**, and **George H. McLaughlin** then in Decennial Census Division.

Administrative support was provided by the Administrative Services Division, **Robert L. Kirkland**, Chief.

User services were provided by the Data User Services Division under the supervision of **Michael G. Garland**, Chief, and **Marshall L. Turner, Jr.** and **Paul T. Zeisset**, Assistant Chiefs.

Data collection activities were supervised in the Field Division by **Stanley D. Matchett**, Chief. Important contributions were made by **Darren F. Althouse**, **Richard F. Blass**, and **Deloris J. Higgins**.

Data processing activities were supervised in the Data Preparation Division by **Don L. Adams**,

Chief. Important contributions were made by **Susan R. Finnegan** and **William P. Eubank**.

Publication planning, design, composition, editorial review, and printing procurement were performed by the staff of Publications Services Division under the general direction of **Walter C. Odom**, Chief; **Gerald A. Mann** and **Everett L. Dove**, Branch Chiefs.

Library of Congress Cataloging in Publication Data

1980 Census of population and housing.

Evaluation and research reports.

PHC80-E Issued July 1985—

Suppl. of Docs. no.: C 3.22³16:980/1

1. United States—Census, 1980—Technique. I. United States. Bureau of the Census. II. Title.

HA201 1980aa 304.6'0723 85-600057

For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Postage stamps not acceptable; currency submitted at sender's risk. Remittances from foreign countries must be by international money order or by draft on a U.S. bank.

1980

Preface

This report is one in a series of Evaluation and Research Reports for the 1980 Census of Population and Housing. The series presents reports on a variety of studies, each designed to produce data on the accuracy of selected subject matter or on the effectiveness of specific methodological features of the census-taking process. The major findings and results from these studies are being published in the PHC80-E series of reports.

1980

Census of Population and Housing

Programs to Improve Coverage in the 1980 Census

PHC80-E3

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Chapter 1. Introduction and Background

THE 1980 CENSUS COVERAGE IMPROVEMENT PROGRAMS

This report presents the results of an evaluation of the 1980 Census Coverage Improvement Programs. In discussing these programs, it is important to review certain aspects of the development of the mailout/mail-back census taking procedure that was employed in 1970 and 1980. In the censuses preceding the development of the mail census, a single straight-forward census-taking methodology was used. An enumerator was given a map of an assignment area and a listing register. The enumerator was instructed to list and enumerate the area on the map. This procedure underwent some quality control reviews, but the total effect that these reviews had on the quality of the resulting census is unknown. In 1970, about 60 percent of the population was enumerated under the mail census procedure. This operation was so successful that in 1980 the mail census was expanded to cover approximately 95 percent of the population.

The basis of the mail census is the preparation of an accurate address list, and the subsequent self-response of persons who receive a questionnaire as well as enumerator contact at addresses which did not return a questionnaire. In the early development of the mail census it was recognized that a single procedure for address list compilation and enumeration, would never result in the best possible census. The principle of redundancy or of numerous checks and reviews was thus adopted. Since no single system could be perfect, a number of overlapping systems were developed with potentially different strengths and weaknesses. This multiple system approach was to be applied to

minimize the overall error in the census taking process. This was the underlying principle of the development, planning, and organization of much of the work associated with the 1970 and 1980 censuses.

The coverage improvement procedures discussed in this report should thus be viewed as a system of overlapping procedures, each intended to reduce some of the errors that would result from preparing an address list and enumerating persons by a single procedure. There are 14 programs discussed in this report which were developed for two broad areas of application—address list preparation in mail census areas prior to data collection, and improvement of coverage during data collection. The 14 programs are as follows:

Coverage Improvement Programs Designed to Improve Coverage of the Address List Prior to Data Collection—

- Advance Post Office Check
- Casing and Time-of-Delivery Post Office Checks
- Precanvass

Coverage Improvement Programs Designed to Improve Coverage During Data Collection—

- Casual Count
- Census Questionnaire Coverage Items

- and Dependent Roster Checks
- Whole Household Usual Home Elsewhere
- Nonhousehold Sources Program
- Vacant/Delete Follow-up
- Prelist Recanvass
- Local Review
- "Were You Counted?" Campaign
- Assistance Centers
- Spanish Questionnaires
- Post Enumeration Post Office Check

The appendix to this chapter gives a brief description of how each of these programs was designed to work. The following two tables summarize the additions to the census and associated costs of these programs. The detailed chapters describe the derivation of these data and the limitations to which they are subject. It should be noted that several of these programs were designed not only to add persons and/or addresses, but also to make appropriate geographical corrections. These geographical corrections resulted in the "transfer" of housing units from one location to another. Additionally, the Post Office operations resulted in corrections, such as street name updates, to the census address lists. These corrections are not given in this report since the impact on coverage improvement could not be measured.

Table 1, below, deals with compilation

Table 1. Additions and Costs of Coverage Improvement Programs to Improve Address List Coverage Prior to Data Collection

(See detailed chapters for Derivation and Limitations)

| Operation | Estimated housing units added or transferred | Estimated persons added or transferred | Estimated costs (dollars) |
|---------------------------------------|--|--|---------------------------|
| Total..... | 6 420 000 | Transferred 16 430 000 | 28 060 000 |
| | Transferred 570 000 | **1 460 000 | |
| Advance Post Office Check..... | 2 000 000 | *5 120 000 | 6 970 000 |
| Casing and Time-of-Delivery Check.... | 2 060 000 | *5 280 000 | 9 290 000 |
| Precanvass..... | 2 360 000 | *6 030 000 | 11 800 000 |
| | Transferred 570 000 | Transferred 1 460 000 | |

*Estimated based on an assumed average household size of 2.56.

of the address list. The address list was prepared by first purchasing a vendor or commercial mailing list in urban areas, and by physically canvassing or prelisting in other areas. The commercial list was updated by all three of the operations listed in the table below. The prelist address list was updated only by the Casing and Time of Delivery Checks. The results shown for the Casing and Time of Delivery Check measure its contribution to both types of initial lists.

Table 2 gives the results of the coverage improvement programs directed at improving census coverage during the data collection phase of the program.

From these tables, it can be seen that the operations aimed at improvement of the basic address list resulted in the addition of about 6,420,000 addresses in which about 16,430,000 persons were enumerated during the census representing about 7.2 percent of the total population count. These operations also produced some duplicate or erroneous enumerations. It was estimated that approximately 250,000 addresses and 640,000 persons could have been duplicated or erroneously enumerated from these procedures. It cost about \$4.40 for each address added by these operations. This cost figure does not reflect the entire cost effectiveness of these operations since they also result in numerous corrections to the addresses on the basic address list.

From the above tables, it can also be seen that the operations conducted during data collection added about 2,600,000 persons or about 1.1 percent of the total population count. This was accomplished at an average cost of about \$28.00 per person added. Some of these operations also resulted in duplicate or erroneous enumerations. Of the operations that can be evaluated, it appears that about 420,000 persons were enumerated erroneously or as duplicates.

Clearly, the coverage improvement programs were expensive and, as will be seen in the following chapters, were prone to operational problems. This resulted in a large measure because the programs were implemented primarily via clerical processing and review. Clerical processing

Table 2. Additions and Costs of Coverage Improvement Programs to Improve Census Coverage During Data Collection

(See detailed chapters for Derivation and Limitations)

| Operation | Estimated housing units added or transferred | Estimated persons added or transferred | Estimated costs (dollars) |
|--|--|--|---------------------------|
| Total..... | 1 332 000 Transferred 48 000 | 2 600 000 Transferred 1 056 000 | 72 730 000 |
| Casual Count..... | N/A | 13 000 | 250 000 |
| Coverage Questions and Dependent Roster Check..... | 93 000 | *240 000 | 7 500 000 |
| Whole Household Usual Home Elsewhere..... | N/A | Transferred *1 000 000 | 550 000 |
| Vacant/Delete Followup..... | **999 000 | 1 720 000 | 36 320 000 |
| Nonhousehold Sources..... | N/A | 130 000 | 9 820 000 |
| Prelist Recanvass..... | 120 000 | 220 000 | 10 290 000 |
| Local Review..... | 53 000 Transferred 48 000 | 76 000 Transferred 56 000 | 4 310 000 |
| Were You Counted..... | 17 000 | 71 000 | 270 000 |
| Assistance Centers..... | N/A | N/A | 2 030 000 |
| Spanish Questionnaires..... | N/A | N/A | 400 000 |
| Post Enumeration Post Office Clerk Check..... | 50 000 | *130 000 | 990 000 |

N/A means not applicable.

*Estimated based on an assumed average household size of 2.56.

**These include the conversion of about 591,000 vacant units to occupied.

operations are very expensive, hard to control and manage, and error prone. It must be recognized that this system of redundant or overlapping checks and reviews as applied in the 1970 and 1980 censuses was expensive and hard to control, but it must also be recognized that this system works. The coverage in 1970 was better than in previous censuses, and the 1980 census is currently reported to be most accurate ever. This system of overlapping checks and reviews is thus crucial to an accurate, complete mail census. (The philosophy of redundancy is also applicable to other census-taking methodologies that could be employed, such as a sample census.) The Census Bureau is currently searching for ways to make this system less labor intensive and thus more cost effective and controllable, and more effective in its impact. The use of automation appears to offer great promise in this area. For example, if computerized matching of large lists can be accomplished, it is possible that a program such as the nonhousehold sources procedure could add a substantial number of persons to the census at reduced costs. Automated matching could also help to eliminate duplicate enumerations, and automated record keeping would provide great enhancements in the area of evaluation. Research is being instituted to integrate automation into this system of redundant checks and reviews. Automa-

tion can make the coverage improvement system more efficient, more effective, and more accurate in future censuses.

TERMINOLOGY, ORGANIZATION, AND DERIVATION OF DATA FOR THIS REPORT

This report is organized into 13 additional chapters. With the exception of chapter 2, each chapter deals with one of the coverage improvement programs listed previously. Chapter 2 combines the analysis of the two post office update operations. Each chapter is designed to be somewhat self-contained, and thus some repetitive detail appears throughout the report.

Most of the 1980 census terminology is defined in each individual chapter. However, the definition of the 1980 census district office is not. In taking the 1980 census, the United States was partitioned into 409 distinct areas. These areas were designed to contain between 100,000 and 300,000 housing units. The 1980 census data collection operations for each of these areas was directed from a single district office. Thus, there were 409 district offices used to conduct the 1980 census.

The major portion of the analysis which this report documents was based on an evaluation of materials that were saved

from the 1980 census. The 409 district offices were arranged into six primary groupings or strata. From this basic stratification various samples of the district offices were selected. Census managers in these sampled offices were directed to save their census materials and return them for analysis purposes. The development of the six strata are described in detail in chapter 2. An initial large sample was drawn from the strata. However, for the evaluation of each particular coverage improvement operation, it was necessary to first supplement this sample during the 1980 census, and then

due to cost limitations, to subsample the sample for evaluation processing purposes. Due to constraints related to the availability and structure of the data for each evaluation, the sampling scheme and associated estimation procedures differed for each evaluation. This necessitated that the sample selection and estimation procedures be discussed for each individual evaluation.

The chapters are organized into three sections and an appendix. The first section presents background and a brief description of the 1980 census operations associated with the coverage improve-

ment program for which the chapter was prepared. Where possible, relevant discussion of the 1970 census is included in this first section. The second section gives the results of the evaluation of the coverage improvement program. The final section of each chapter presents a summary of the data and some conclusions which can be made. If relevant, this last section also includes some of the plans for the further development of the coverage improvement program for the 1990 census. The appendix describes the sample design, estimation procedures, and methodologies employed for the evaluation.

Appendix 1. Coverage Improvement Program Descriptions

ADVANCE POST OFFICE CHECK

This operation was conducted only in areas where the commercial vendor lists of addresses were used. The Advance Post Office Check took place in the summer of 1979. The United States Postal Service compared the commercial vendor addresses to their internal records. Residential addresses to which the Postal Service delivered (or could deliver) mail, and which were not on the list were given to the Census Bureau. Non-deliverable or non-residential addresses were designated by the Postal Service to be deleted from the address list.

CASING AND TIME-OF-DELIVERY POST OFFICE CHECKS

The Casing and Time-of-Delivery Post Office Checks were instituted shortly before the census in areas where the commercial vendor lists were used and also in areas where census enumerators prepared the list. The Casing Check was scheduled to start on March 5, 1980 and the Time-of-Delivery Check on March 28, 1980. For both of these checks, postal carriers were instructed to check to see if they had received a census mailing piece for each address on their route. Those addresses for which a mailing piece had not been prepared were sent to the Census Bureau on blue cards and are referred to as "Blue Card" adds. The postal carriers also returned undeliverable mailing pieces to the Census Bureau at central locations, not to the operating people in the district offices.

PRECANVASS

Prior to Census Day in areas where the

commercial vendors list was used, the prec canvass operation took place. Census enumerators physically canvassed areas with copies of the commercial list (updated only by the Postal Service) in their hands. They verified the accuracy of the list and added any units they found that were not on the list.

CASUAL COUNT

This was an operation where interviews were conducted by census takers in places frequented by persons with a high probability of being missed in the census. Examples of places to be canvassed were bars, pool halls, theaters, and city parks. It was then determined if these persons had been enumerated by the census; they were appropriately added to the census if they had been missed.

CENSUS QUESTIONNAIRE COVERAGE ITEMS AND DEPENDENT ROSTER CHECK

Several questions on the census questionnaire were designed to obtain better coverage of persons and housing units. For example, question Q1 asked respondents to list all household members on the outside of the questionnaire. If this list disagreed with the number of person columns filled out inside the questionnaire, a followup interview was conducted to resolve the differences. Question H4 was intended to identify missed housing units within small multiunit structures. In areas where the mail census was used, item A2 on the cover of the questionnaire indicated the number of questionnaires mailed to units with the same basic street address. The H4 entry (inside the questionnaire) asked "How many living quarters are at

this address?" If the H4 entry was larger than the A2 entry, the original pre-mail address register was further checked and if the discrepancy still existed, a followup was made. Three additional questions were also designed to verify the completeness of the household roster. These items were verified and persons were added to the census as a result of followup operations. The dependent roster check also was designed to improve within household coverage. Certain households enumerated in the census were followedup for various reasons, such as failing a content edit. At the time of the interview respondents were asked to verify whether any persons were left off the questionnaire.

WHOLE HOUSEHOLD USUAL HOME ELSEWHERE

This operation was designed to correctly enumerate households temporarily away from their usual residence on census day. In previous censuses these households, if identified as temporary residents, were assumed to be enumerated at their usual residence. The 1980 census procedures checked at the usual place of residence to make sure that the household was enumerated there. If not, it was added to the census at that usual address.

NONHOUSEHOLD SOURCES PROGRAM

The 1980 Nonhousehold Sources Program was a records check procedure aimed at reducing the differential undercount of minorities. Lists were obtained from the Department of Motor Vehicles in each State and from the U.S. Immigration

and Naturalization Service. The lists were screened to identify persons in areas of concentrated minority populations. These persons were matched to the census; non-matches were followed up and persons determined to be missed were added to the census.

VACANT/DELETE FOLLOWUP

If occupied housing units are incorrectly classified as vacant, their occupants are likely to be missed in the census. For the 1980 census, all censusidentified vacant units were revisited to verify their vacancy status. Occupants of units reclassified from vacant to occupied were added to the census if they were not enumerated elsewhere. Similar procedures were applied for addresses classified by a census taker as nonexistent at the time of the initial visit.

PRELIST RECANVASS

For some of those areas where the census address list was prepared by the precensus prelist operation, the prelist recanvass program was instituted. This was an additional check on the completeness of the address listings in the more rural parts of the prelist area where past evidence had shown coverage problems to be relatively severe. The recanvass was done during the late census followup operations. In addition to adding units that the census missed, the

recanvass also identified and removed duplications.

LOCAL REVIEW

At approximately the midpoint of the census, small area population and housing counts were provided to local government officials to review. Count discrepancies received from these sources, if sufficiently substantiated, were investigated by the census field offices. As a result of these operations, a recanvass operation occurred in specific areas with the result that housing units and persons were added to the census. Geographic problems were also identified and resolved at this time.

WERE YOU COUNTED? CAMPAIGN

The "Were You Counted?" campaign was designed to discover and add to the census persons who had been missed. At the conclusion of the regular census enumeration, a "Were You Counted?" questionnaire listing all population questions was sent to newspapers, which had discretion whether to publish it and, if so, how long it was published. Respondents were asked to complete the questionnaire if they believed they or any members of their family had not been enumerated. For persons who responded to this inquiry, the Bureau determined if they were already enumerated in the census. They were added if it was determined that they had been missed.

ASSISTANCE CENTERS

Assistance centers were established throughout the United States to help people fill out the census questionnaire. Assistance was given by both telephone and in person, either in the local census office or in centralized locations, such as storefront sites.

SPANISH QUESTIONNAIRES

Census questionnaires were made available in Spanish and could be requested either by phone or by marking an appropriate box on the mailed out English questionnaires. Census takers also had Spanish questionnaires available to use upon request.

POST ENUMERATION POST OFFICE CHECK

This check was designed to improve census coverage in those areas where the traditional door-to-door list-and-enumerate procedure was used. After the census enumeration was completed, the Postal Service reviewed the addresses that had been collected by the Census Bureau. From this review, housing units that the census may have missed were identified and followed-up. Both housing units and persons were added to the census from this operation when they were found not to have been enumerated.

Chapter 2. Post Office Updates

INTRODUCTION AND BACKGROUND

As will be discussed throughout this document, the basic methodology on which the 1980 census was based was a mail-out/mail-back procedure. Under this procedure, about 95 percent of the population was enumerated by being mailed a questionnaire with instructions to complete the questionnaire and mail it back. The initial 1980 census address list was compiled in two basic ways, depending upon type of area. In the more urban areas where a commercial mailing list was available, where the Census Bureau maintained a computerized geocoding system, and where city mail delivery existed, the Census Bureau purchased the commercial list and updated it. In the remaining areas where it was thought that a mail census could be successfully conducted, census enumerators prepared an initial list by physically canvassing assignment areas. This list was then updated. Clearly, involving the Post Office in reviewing the address list prior to the census mail-out is critical. The Post Office was requested to review the census address lists in five different capacities for the 1980 census.

The first two Post Office update procedures were the Advance Post Office Check I (APOC I) and the Advance Post Office Check II (APOC II). These operations transpired in the summer of 1979 and were directed at updating the commercial address list. In APOC I, the Post Office examined the commercial list and recorded residential addresses which were not on the commercial list on cards, "Blue Cards", (facsimile A, shown at the end of this chapter). The Post Office also corrected addresses and deleted addresses to which mail could not be delivered.

APOC II was an operation which double-checked the correctness of addresses designated by the Post Office as being undeliverable during APOC I. No evaluation was conducted for APOC II, since data relating to APOC II could not be obtained.

The next two postal operations were the Casing Check which was scheduled for March 5, 1980, and the Time-of-Delivery Check scheduled for March 28, 1980. Each of these two pre-enumeration activities were undertaken in all mail census areas. The Post Office carriers were given the census mailing pieces and they checked to see that they had received a questionnaire for each residential address on their route. Again, addresses the postal carriers found to be missing were recorded on "Blue Cards". The questionnaires with undeliverable or duplicate addresses were returned to the Census Bureau at central locations, not to the district offices. The results of the evaluation of these two operations will be presented jointly since their data could not be separated. They will be referred to as C/TOD in subsequent discussions.

Finally, the Post Enumeration Post Office Check was conducted in the extremely rural and sparsely populated portions of the United States where a door-to-door list and enumerate census was employed. This review was conducted after the initial census enumeration, and is discussed in detail in chapter 14.

The Census Bureau processed the blue cards that were received from the Post Office as follows:

First, the blue cards were geocoded, or assigned a Census Bureau geographic code, by address. The APOC cards were computer geocoded and the C/TOD cards were geocoded clerically in the census district office to which they were sent.

Upon completion of the computer or office geocoding, remaining ungeocoded addresses received from APOC were recorded on "Yellow Cards" and sent for field coding as described in chapter 3. The ungeocodable C/TOD addresses were sent for immediate field coding.

Finally, the C/TOD blue cards that were successfully geocoded were matched to the Census Bureau address registers. Those that did not match an existing address were added to the census records for subsequent enumeration.

The basis for instituting these five distinct post office updating procedures was essentially the 1970 census experience. These five operations were successfully employed in 1970 to update the census address list [1].

RESULTS

The results discussed below are estimates that were derived from a review of a sample of materials saved from the 1980 census for evaluation. Appendix 2 describes the sample design and evaluation methodologies that were used to produce the data discussed in this section.

The Advance Post Office Check

The Census Bureau submitted approximately 38 million addresses to the Post Office for examination in APOC I. After reviewing these addresses, the Post Office sent the Census Bureau about 5 million new addresses from APOC I. The Post Office also made changes, either corrections or deletions, to an additional 2.9 million existing addresses. Thus, the Post Office prepared some kind of record for approximately 7.9 million addresses in areas where APOC I was conducted.

Table 3. Results of 1980 Census Enumeration and Processing for Advance Post Office Check Addresses

| Results of 1980 Census enumeration and processing | Estimated number | Standard error | Estimated percent | Standard error (percentages) |
|---|------------------|----------------|-------------------|------------------------------|
| Total addresses..... | 2 200 000 | 1 300 000 | 100 | - |
| Enumerated as occupied..... | 1 833 000 | 1 200 000 | 83.3 | 54.5 |
| Enumerated as vacant..... | 130 000 | 85 000 | 5.9 | 3.9 |
| Enumerated--occupancy status undetermined..... | 7 000 | 7 000 | 0.3 | 0.3 |
| Deleted from Census address lists.... | 113 000 | 74 000 | 5.1 | 3.3 |
| Enumerated as a duplicate of another address..... | 47 000 | 38 000 | 2.1 | 1.7 |
| Enumeration status undetermined..... | 70 000 | 53 000 | 3.2 | 2.4 |

- Means not applicable.

The 5 million new addresses were sent through the census geocoding programs and then were unduplicated with the previous census addresses. After this process a total of about 2.2 million additional addresses remained. These 2.2 million addresses were added to the 1980 census address list for census processing and enumeration. Table 3 gives a breakdown of the results of the 1980 Census processing and enumeration procedures for these addresses.

The data in table 3 have unusually high standard errors. This may be a result of an upward bias in the procedure used to estimate the standard errors. The bias seems likely since the 5 million addresses that were received from the post office are not based on a sample but are actual census records and not subject to sampling variability. The 2.2 million estimated figure for total addresses that ended up as geocodable seems to be what would be expected from a given total of 5 million addresses and is thus more accurate than the 1.3 million standard error indicates. In any event the interpretation of these data must be handled with care due to the potential for extreme variability.

As can be seen in table 3, about 2 million addresses were added to the 1980 census after all processing and enumeration. Of these, about 1.8 million were enumerated as occupied. The 2.2 million addresses in table 3 represent about 5.8 percent of the total census address lists for the areas covered by this operation.

The Advance Post Office Check cost about \$6,970,000. Of this total about \$4,560,000 was paid to the Post Office, and the remaining \$2,190,000 was spent by the Census Bureau in office and com-

puter processing. It cost about \$3.50 for each address added to the 1980 census from this check. This figure was calculated by dividing the total Advance Post Office Check estimated cost by the number of addresses added. However, the costs include expenditures on corrections to the address list. Thus, the \$3.50 figure is an over estimate of the actual cost to make an addition to the census.

The Casing and Time-of-Delivery Post Office Checks

There were two sources of data regarding the number of addresses received from the Post Office as a result of C/TOD. One source of data were records that were kept by each 1980 census district office of the number of address cards that were received. This estimate is about 7.1 million addresses. The other source of data was the review of materials saved from the 1980 census, in a sample of district offices, that is described in detail in the appendix to this chapter. This

resulted in an estimate of about 3.7 million address cards that were prepared by the Post Office.

A detailed discussion of this discrepancy is given in [2]. The remainder of the discussion presented will be based on the 3.7 million estimate. It must be noted, however, that the estimates given below could be low, and subject to some biases that can arise from missing data.

Table 4 below presents the results of the census processing for the 3.7 million address cards received from the C/TOD Post Office Checks.

As can be seen in table 4, about 2 million or 56.3 percent of the 3.7 million C/TOD addresses were enumerated in the 1980 census. Of these, 1.8 million were enumerated as occupied. The 2 million addresses enumerated in the 1980 census also represent about 3.4 percent of all housing units counted by the 1980 census in mail census areas.

In the 1970 census, a total of 2.4 million addresses were received from Casing and Time-of-Delivery checks. Of these, about 59.9 percent were added to the 1970 census counts. Thus, close parallels can be seen to exist between the processing results for the 1970 and 1980 census Casing and Time-of-Delivery Post Office check operations. It can also be seen that in both 1970 and 1980, the C/TOD operation resulted in a substantial increase to the address list.

The 1980 Census cost for the Casing and Time-of-Delivery Check operation was about \$9,290,000. Of this amount, about \$5,850,000 was paid to the Post Office

Table 4. Results of 1980 Census Enumeration and Processing for Casing and Time-of-Delivery Checks Addresses

| 1980 Census enumeration and processing results | Estimated number | Standard error | Estimated percent | Standard error (percentage) |
|---|------------------|----------------|-------------------|-----------------------------|
| Total addresses..... | 3 656 000 | 167 000 | *100.0 | - |
| Enumerated as occupied..... | 1 846 000 | 135 000 | 50.5 | 3.7 |
| Enumerated as vacant..... | 185 000 | 23 000 | 5.1 | 0.6 |
| Enumerated--occupancy status undetermined..... | 25 000 | 7 000 | 0.7 | 0.2 |
| Previously in census address list.... | 381 000 | 32 000 | 10.4 | 0.9 |
| Added to Census Address List, but subsequently deleted..... | 244 000 | 20 000 | 6.7 | 0.5 |
| Not added--found to be for a Post Office Lockbox..... | 277 000 | 30 000 | 7.6 | 0.8 |
| Not geocoded..... | 446 000 | 40 000 | 12.2 | 1.1 |
| Not added--Miscellaneous..... | 252 000 | 25 000 | 6.9 | 0.7 |

* Percents do not add to 100 due to rounding.

- Means not applicable.

and the remaining \$3,440,000 was spent by the Census Bureau in office processing of the C/TOD addresses. Thus, it cost about \$4.50 for each address that was added from the Casing and Time-of-Delivery check operations. It should be noted that the costs of the field geocoding procedures could not be separated from that which was spent on processing the yellow cards (field geocoding is described in chapter 3). However, it is expected that this cost was relatively minor. As with the Advance Post Office Check, the costs on which the \$4.50 rate is based include costs for corrections that were made to the address list. This rate is thus an overstatement of the actual cost for additions to the census.

CONCLUSIONS

In summary, the Advance Post Office Check resulted in an estimated 5.5 percent increase to the 1980 census address list in areas where the commercial address

list was used. In all mail areas the Casing and Time-of-Delivery Post Office Checks resulted in a 3.4 percent increase to the address list. However, as is discussed in detail in chapter 3, the Casing and Time-of-Delivery addresses may have included some addresses that were credited to other coverage improvement programs. The post office update procedures were also rather cost effective, since it cost no more than \$3.50 and \$4.50 respectively, for each address added by the Advance and the Casing and Time-of-Delivery Checks. Clearly, the Post Office made a significant contribution to the development of the 1980 census address list for mail census areas.

In planning for the 1990 census, the Bureau is studying ways of making the Post Office participation in address list compilation even more effective. Several areas that are being tested are expanding the Advance Post Office Check into all mail census areas, expanded procedures to more thoroughly identify apartments in small multi-unit buildings, new quality control procedures to improve USPS

operations, and automating many phases of the updating procedure.

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Appendix 2. Sample Design, Estimation, and Evaluation Methodology

As described in the preceding sections, this evaluation was based on the review of a sample of 1980 census materials.

SAMPLE DESIGN

The sample was essentially a two-stage stratified sample. For the first stage of sample selection, the 409 census district offices were arranged into six strata based on characteristics of the 1980 census procedures that were conducted for each of the district offices. As a brief background, the stratification was developed based on the following census characteristics:

1. **Type of census, centralized or decentralized mail-out/mail-back**—The centralized census procedure was conducted in the central parts of large cities where it was thought that enumeration would be difficult. The centralized operation was characterized by having as much of the work as possible take place in one office under close supervision. The decentralized census procedure was conducted in the remaining areas where a mail-out/mail-back census procedure was conducted. Under the decentralized procedure, census enumerators worked from their homes to conduct many of the census operations, such as a followup of questionnaires which were not returned by mail or those questionnaires which failed the edit.
2. **Conventional or two-procedure census**—In 36 of the district offices, the door-to-door list-and-enumerate procedure was used to some extent. Those areas were considered to be too sparsely populated to conduct a mail census effectively. The two-procedure

census was used in some district offices where the conventional door-to-door list-and-enumerate and the decentralized mail-out/mail-back enumeration methods were used in different areas in the district office.

3. **Type of area, urban or rural**—The census district offices were also identified as being either primarily rural or primarily urban. Essentially, this was only needed for the decentralized offices, since the centralized were considered to be urban and the conventional and two-procedure offices were considered to be rural.
4. **Presence of the Prelist Recanvass operation**—As will be discussed in chapter 3 and in chapter 9, the prelist census areas consisted of the mail census areas where the basic address list was prepared by enumerator canvass—not by updating a commercial address list. As discussed in chapter 9, the Prelist Recanvass procedure was adopted in some district offices as a means of improving census coverage.

Using the above census characteristics, the 409 census district offices were arranged into the six strata as described in table 5, below. Table 5 also indicates the sample sizes selected for the Post Office evaluation.

The first stage sampling was a simple random sample selected without replacement from each stratum.

The second stage sampling unit was the 1980 census enumeration district. An enumeration district is a small area respecting all census boundaries, and designed to contain between 300 and 600 housing units. Within each sampled district office a sequential sampling procedure was used to select 68 enumeration districts which contained postal updates.

ESTIMATION

For any desired characteristic of interest, Y , it was estimated as \hat{Y} , where

$$\hat{Y} = \sum_{h=1}^6 \sum_{i=1}^{n_h} \sum_{j=1}^{m_{hi}} \frac{N_h}{n_h} \frac{M_{hi}}{m_{hi}} y_{hij}$$

Table 5. Stratification and Sample Counts of Census District Offices for the Post Office Updates Evaluation

| Stratum number | Stratum description | Number of district offices in stratum | Number of district offices in sample |
|----------------|---|---------------------------------------|--------------------------------------|
| | Total..... | 409 | 50 |
| I | Centralized district offices in a city of 1,000,000 or more persons.. | 39 | 5 |
| II | Balance of centralized district offices..... | 48 | 5 |
| III | Decentralized district offices without Prelist Recanvass Operation | 194 | 15 |
| IV | Decentralized district offices with Prelist Recanvass Operation--Urban..... | 67 | 8 |
| V | Decentralized district offices with Prelist Recanvass Operation--Rural..... | 25 | 8 |
| VI | Conventional district offices..... | 36 | 9 |

where,

- N_h denotes the total number of district offices in the h^{th} stratum.
- n_h denotes the number of sampled district offices in the h^{th} stratum.
- M_{hi} denotes the total number of enumeration districts in the i^{th} sampled district office in the h^{th} stratum.
- m_{hi} denotes the total number of sampled enumeration districts in the i^{th} sampled district office in the h^{th} stratum.
- y_{hij} denotes the observed total in the j^{th} sample enumeration district in the i^{th} sampled district office in the h^{th} stratum.

Estimates of standard errors were obtained as the result of a complex estimation technique which is beyond the scope of this report to discuss. A description of this procedure is given in [3] and [4]. The

Advance Post Office Check data were estimated to be extremely variable, but this was not the case for Casing and Time-of-Delivery Check data. This could be the result of a bias in the variance estimation technique as was discussed above. It must also be noted that while the Casing and Time-of-Delivery Check data do not have high estimated standard errors due to sampling, they could be subject to some missing data biases. These limitations to which the data are subject must be carefully considered in any interpretations that are made in regard to the Post Office update results.

EVALUATION METHODOLOGY

In general, the evaluation of the Post Office Updates was conducted by examining each of the address blue cards in the sample of enumeration districts. Each card was examined to determine how it had been processed, and was also matched against the 1980 census address records. If a match occurred, the enumeration

status of the address was recorded.

There was a problem in identifying if the addresses that had been added to the census and also recorded on postal blue cards had actually been added by the Post Office. As will be discussed in chapter 3, the prec canvass and yellow card operations were also conducted when the C/TOD checks were being conducted. The 1980 Census office staff had been instructed to use specific color pencils to make particular adds to the 1980 census address registers (e.g., postal adds were to be made in blue pencil). This would have distinguished between operations in the post census evaluation of various operations. It soon became apparent during this evaluation that this instruction had not been properly followed. Thus, it was very difficult to distinguish if the address adds had been made as a result of a postal update or from some other coverage improvement operation. The data tabulated in this chapter for Postal update address adds include those addresses which could also have been added by another operation.

Chapter 3. The Precanvass Operation

INTRODUCTION AND BACKGROUND

The 1980 Census Precanvass Operation was one of the methodologies employed by the Census Bureau in compiling the address list in urban areas. As was mentioned in earlier chapters, the 1980 census was conducted primarily as a mail-out/mail-back/followup census in which respondents were mailed a questionnaire to complete and mail back. Enumerators visited each housing unit which did not mail back a questionnaire. Thus, a complete and accurate address list was an essential component of the census. In the more urban areas of the United States, where a commercial mailing list was available and where the Census Bureau was able to assign census geographic codes by computer, the address list was compiled by first purchasing a commercial mailing list and then updating it with both of the postal checks described in the previous chapter and by the precanvass operation. The areas covered by this address list are referred to as Tape Address Register (TAR) areas. In the remaining areas where a mail census was to be conducted, the Census Bureau compiled the address list by first having the area canvassed by census enumerators, and then updating the list by postal checks. These areas are referred to as Prelist areas.

In the TAR areas, the commercially purchased mailing list was sent for an Advance Post Office Check (APOC) in August of 1979. As a result of this check the post office added residential addresses which were not on the list, identified undeliverable or non-residential addresses, and corrected existing addresses, if required. The APOC' updated commercial mailing list was then run through the Cen-

sus Bureau's geocoding programs. As a result of this operation, it was possible to assign geographic codes, such as tract and block number, to approximately 40 million addresses. This geocoding operation also produced an additional 6 million addresses which could not be computer geocoded, but which appeared to be potentially good addresses. These uncoded addresses were printed on cards (yellow cards) for field geocoding.

The 40 million coded addresses were structured into Enumeration Districts (ED's), small geographic areas consisting on an average of about 300 to 600 addresses which did not cross any geographic boundaries recognized by the Census Bureau. A Master Address Register was prepared for each ED. The Master Address Register contained a computer printed listing of each address geocoded to the ED. A Precanvass Address Register was also printed for each ED. The Precanvass Address Register contained a listing of each basic address and the number of housing units associated with each basic address that had been assigned to the ED, but unlike the Master Address Register, it did not identify each separate housing unit or apartment at the basic street addresses.

The precanvass field operation took place in February and March of 1980. This was a dependent canvass procedure in which a census enumerator was given a Precanvass Address Register and a map for an ED and told to canvass the entire ED, to add missed residential units, to delete erroneous units, and to verify, for each basic address, that the number of units listed in the Precanvass Address Register was correct. When an enumerator discovered more units in a basic address than were listed in the Precanvass Address Register, the enumerator listed

the apartment designation of each unit at the basic address in the Precanvass Address Register.

As a quality check on the precanvass enumerator's work, a sample of housing units was deliberately suppressed from the Precanvass Address Registers. Later, the precanvass enumerator's work was redone if too many of the suppressed units had not been reinstated.

At the conclusion of the precanvass field operation, an office operation took place in which the updated Precanvass Address Registers were compared to the Master Address Registers. Several procedures were employed to update the Master Address Registers based on the results of the precanvass field operation. If the precanvass enumerator indicated that one or more units in a basic address had been missed, it was necessary to compare the apartment designations listed in the Precanvass Address Register with those in the Master Address Register in order to determine which units were missed. This operation was complicated when the apartment designations from the two sources did not agree. For those basic addresses that the precanvass enumerator found to have been missed, a search operation was instituted to determine if the basic address appeared in a different ED and/or block. Those basic addresses found in a different ED or block were examined to see if the precanvass enumerator for this new location had deleted the basic address. If so, these basic addresses were added to the correct geography and referred to as precanvass transfers. In the situation where the same basic address was found to exist in two different geographic locations, a field reconciliation operation was instituted. Thus, the results of the precanvass were used to both add missed units and transfer

existing units to correct geography. It should be noted that in those basic addresses for which the number of units listed in the Precanvass Address Register was equal to or less than what the enumerator found, no attempt was made to verify the apartment designations.

The precavass office operation was further complicated by the field reconciliation of the yellow cards which represented addresses that required field geocoding. The materials were delivered late to the field which resulted in the precavass and the yellow card operations being conducted either simultaneously or in reverse order. This complicated the precavass office operations, since in some instances yellow card corrections had been made to the Master Address Registers and in some instances they had not. Special procedures had to be developed for these situations.

After the conclusion of the precavass operations, two additional postal reviews were instituted to further update the address list. These were the Casing and the Time-of-Delivery checks. As a result of these operations, the post office again added missing addresses, identified undeliverable or nonresidential addresses, and

corrected existing addresses if required.

The units added by the Post Office were delivered to the Census Bureau on blue cards and are thus referred to as blue card adds. Unfortunately, the precavass adds often were not included in the Casing and the Time-of-Delivery checks so that duplicate adds sometimes were received. This necessitated the implementation of a difficult unduplication operation.

RESULTS

The results of the analysis of the precavass operation are given below. These data are estimates which were obtained from a review of a sample of materials saved from the 1980 Census. The appendix to this chapter describes the sample and evaluation procedures.

Additions to the Census From the Precavass

Based on the precavass evaluation, it was estimated that the Precavass Address Registers contained about 5,070,000 added listings. It was possible to distinguish which of these added

listings could have been added from the precavass alone, or from both the precavass and the yellow or blue card procedures. Furthermore, it was possible to estimate which of these adds were transferred to correct geography, or were duplicates of other listings. A breakdown of these adds is as given in table 6, below:

In table 6, "Total" adds indicates the estimated total number of added listings in the Master Address Registers which match to an added listing in the Precavass Address Registers. (It should be noted that the total added listings to the Master Address Registers represent the total added listings to the 1980 census identified with a precavass address register). The "Net" adds are the listings which remain after the duplicates and transfers are taken out. Clearly, there are a substantial number of addresses which could have been added by the Precavass or from Yellow and/or Blue Cards. However, since these operations were not performed in the proper sequence, the data in the above table must be viewed as overstatements of the potential for overlap between the Precavass and Yellow and/or Blue Card procedures.

Census Address Adds From All Sources

It was also possible to estimate whether or not the remaining added listings to the Master Address registers had resulted from Yellow or Blue cards alone or from some other source. Table 7 gives these data.

The estimated total number of added listings can be compared to the known increase in the Master Address Register listings from the 1980 census. Prior to the census procedures, the TAR Master Address Registers contained 40,077,000 addresses. When the 1980 census was processed, a total of 47,258,000 listings were counted. Thus, the net increase to the TAR area was about 7,180,000 listings. This is 1,020,000 less than the total 8,200,000 estimated above. However, it was possible to estimate that about 570,000 of the precavass additions matched to a computer listing that

Table 6. Estimated Precavass Adds, Source by Type

(Standard errors in parenthesis)

| Type of add | Source of add | | |
|---------------------------|------------------------|---|------------------------|
| | Precavass only | Precavass and Yellow or Blue Card procedure | Total |
| Total added listings..... | 2 910 315 (490 000) | 2 160 982 (550 000) | 5 071 297 (710 000) |
| Duplicate listings..... | 102 449 (21 000) | 88 340 (18 000) | 190 789 (39 000) |
| Transfers..... | 451 020 (92 000) | 120 833 (25 000) | 571 853 (120 000) |
| Net added listing..... | 2 356 846 (400 000) | 1 951 809 (500 000) | 4 308 655 (600 000) |

Table 7. Structure of Total Adds to the Census Estimated by the Precavass Evaluation

(Standard errors in parenthesis)

| Source of adds | Precavass only | Precavass Yellow and Blue Card | Yellow and Blue Card only | Other source | Total |
|--|------------------------|--------------------------------|---------------------------|------------------------|--------------------------|
| Number of adds..... | 2 910 315 (490 000) | 2 160 982 (550 000) | 1 506 590 (230 000) | 1 624 879 (210 000) | 8 202 766 (1 100 000) |
| Percent of adds..... | 35.5 (6.0) | 26.3 (6.7) | 18.4 (2.8) | 19.8 (2.6) | 100.0 - |
| Percent increase to the TAR area*..... | 6.2 (1.0) | 4.6 (1.2) | 3.2 (0.5) | 3.4 (0.4) | 17.4 (2.3) |

*There were about 47,258,000 addresses in the TAR Area. - Means not applicable.

had been deleted by some 1980 census operation. The estimated total increase from the update operations can be shown to represent a net increase of about 7,630,000 listings. Thus, the net increase estimated from the precanvass analysis can be shown to be only about 450,000 higher than the known increase of 7,180,000 listings in TAR areas. Since this study did not investigate the correspondence between deleted computer printed cases and adds from the "Yellow and Blue Cards only" and "Other Source" categories, it is possible that these two categories could also contain some adds which matched to deleted computer printed lines. The 1,620,000 adds that resulted from "Other Sources" could have come from other census enumeration procedures, or from Yellow and/or Blue Cards which were not transmitted for analysis. These data provide some indication that the materials on which this evaluation was based were relatively complete.

Precanvass Adds by Type of Structure

It is also of interest to examine the net precanvass adds by the type of structure in which they were found. Table 8 gives these data.

As may be seen from table 8, the proportion of single units is higher than the national figure of 58.9 percent for central cities of SMSA's but not significantly different from the 66.7 figure for percent of single unit addresses for urban portions of SMSA's. It does not appear that the

precanvass operation added addresses differentially by type of structure.

Demographic Characteristics

Finally, it was possible to estimate demographic characteristics of those persons enumerated in the housing units added by the precanvass, Yellow and Blue card operations. Table 9, below, displays these data for race and Spanish/Hispanic origin by type of structure.

Table 10 gives estimated overall census race and Spanish/Hispanic origin counts obtained from the census for areas in which the precanvass was conducted.

As can be seen in tables 9 and 10 above, the persons enumerated in housing units added by the precanvass Yellow

and Blue Card operations exhibited a racial distribution similar to the general population. The data for within multi-unit structures appear, on the surface, to be disproportionately high in minority percentages. However, a comparison of these race counts by centralized versus decentralized census areas indicate that the within multi-unit structure precanvass adds occurred primarily in centralized areas and that the racial distribution for these persons closely parallels the distribution for the centralized population counted in the 1980 census.

CONCLUSIONS

In summary, the precanvass operation added an estimated 2.36 million addresses to the census. The cost was approximately \$11,800,000. Thus, the precanvass was cost effective, costing about \$5.00 per address added. While the precanvass operation alone added a substantial number of units to the census, it also overlapped considerably with the post office and yellow card operations.

In looking towards 1990, the Census Bureau is exploring automation not only for controlling the operations, but also for providing timely evaluation results. The Census Bureau is also studying improvements for quality control procedures. The apartment designation discrepancies problem is being addressed by testing a unit-by-unit precanvass approach as opposed to the structure-by-structure procedure used in 1980. Expanded post office update methods also will address this prob-

Table 8. Estimated Precanvass Adds by Type of Structure

(Standard errors in parenthesis)

| Type of add | Number of adds | Percent |
|---|------------------------|----------------|
| Total..... | 2 356 846 (400 000) | 100.0 - |
| Single unit add.... | 1 575 798 (300 000) | 66.9 (12.8) |
| Whole multi-unit structure..... | 555 009 (120 000) | 23.5 (5.0) |
| Within existing multi-unit structure..... | 226 039 (28 000) | 9.6 (1.2) |

- Means not applicable.

Table 10. Overall Census Race and Spanish/Hispanic Origin Counts for JAR Areas

| White | | Black | | Other | | Spanish/Hispanic | |
|-------------|---------|------------|---------|-----------|---------|------------------|---------|
| Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| 162 040 178 | 83.1 | 22 865 370 | 12.2 | 9 089 843 | 4.7 | 11 925 180 | 6.1 |

Table 9. Estimated Race and Spanish/Hispanic Origin for Persons Enumerated in Housing Units Added From the Precanvass, Yellow and Blue Card Operations, by Type of Structure

(Standard errors in parenthesis)

| Type of structure | Race/origin | | | | | | | |
|--|---------------------------|----------------|------------------------|---------------|----------------------|---------------|----------------------|---------------|
| | White | | Black | | Other | | Spanish/Hispanic | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Total..... | 11 561 469 (1 500 000) | 85.0 (11.0) | 1 267 055 (220 000) | 9.3 (1.6) | 777 315 (290 000) | 5.7 (2.1) | 732 421 (240 000) | 5.4 (1.7) |
| Single unit add..... | 8 309 928 (1 100 000) | 87.6 (11.3) | 668 920 (110 000) | 7.1 (1.2) | 508 394 (190 000) | 5.4 (2.0) | 417 370 (140 000) | 4.4 (1.4) |
| Whole multi-unit structure add..... | 2 518 065 (320 000) | 81.6 (10.5) | 405 538 (69 000) | 13.1 (2.2) | 161 296 (60 000) | 5.2 (1.9) | 158 178 (51 000) | 5.1 (1.7) |
| Within existing multi-unit structure add.... | 733 476 (95 000) | 71.0 (9.2) | 192 597 (33 000) | 18.6 (3.2) | 107 625 (40 000) | 10.4 (3.9) | 156 873 (51 000) | 15.2 (4.9) |

lem. Finally, in view of the number of single unit structures added, and the notable overlap between the precanvass and Post Office adds, the Census Bureau

is evaluating the expansion of the precanvass into rural areas, where previously only the Post Office had updated the address list.

REFERENCES

- [1] Sausman, Ken, *Sample of DOs for Coverage Improvement Evaluation Program*, Census Bureau Internal Memorandum, June 15, 1982.

Appendix 3. Sample Design, Estimation, and Evaluation Methodology

The sample design, estimation, and evaluation methodology are given briefly below.

SAMPLE DESIGN

The sample was essentially a two-stage cluster sample. The first-stage unit was the district office. The second-stage unit was the Enumeration District within district office. The sample of district offices was selected from the 409 district offices set up for the 1980 census. Prior to sampling, the district offices were separated into the six strata described below. The appendix for chapter 2 presents a detailed description of these strata.

Samples of district offices were selected randomly from each of the 6 strata, and then this sample was supplemented several times with additional samples of district offices. A detailed description of the sample is given in [1]. Within a selected district office, ED's were selected systematically with equal probability. A sample of forty-three district

offices was selected, and about 50 ED's were sampled in each district office.

ESTIMATION

The estimate of a characteristic of interest for a specific sample DO in a specific stratum is obtained by the Horvitz-Thompson estimator as

$$\hat{Y}_{hi} = \frac{1}{P_{hi}^{(2)}} \sum_{j=1}^{M_{hi}} Y_{hij}$$

where,

Y_{hij} is total of characteristic in the j th sample ED in the i th sample DO in the h th stratum,

$P_{hi}^{(2)}$ is the 2nd stage selection probability of sample ED's in the i th sample DO in the h th stratum, and

M_{hi} is the number of sample ED's in the i th sample DO in the h th stratum.

The estimate of a characteristic of interest for a specific stratum is

$$\hat{Y}_h = \frac{X_h}{\sum_{i=1}^{n_h} \frac{X_{hi}}{P_{hi}^{(1)}}} \sum_{i=1}^{n_h} \frac{Y_{hi}}{P_{hi}^{(1)}}$$

where,

$p_{hi}^{(1)}$ is the 1st stage selection probability of the i th sample DO in the h th stratum,

X_h is the total number of housing units in the h th stratum,

X_{hi} is the total number of housing units in the i th sample DO in the h th stratum, and

n_h is the number of sample DOs in the h th stratum.

Furthermore,

$$\hat{Y}_h = \sum_{i=1}^{n_h} \sum_{j=1}^{M_{hi}} \left[\frac{X_h}{\left(\sum_{k=1}^{n_h} \frac{X_{hk}}{P_{hk}^{(1)}} \right) P_{hi}^{(1)} P_{hi}^{(2)}} \right] Y_{hij}$$

$$= \sum_{i=1}^{n_h} \sum_{j=1}^{M_{hi}} W_{hi} Y_{hij}$$

where W_{hi} equals the expression in the brackets above.

Thus, the estimate \hat{Y}_h for stratum h is a weighted estimate with weight W_{hi} assigned to sample DO i in stratum h for all $i = 1, \dots, M_{hi}$ and $h = 1, 2, \dots, 6$.

VARIANCE ESTIMATION

The estimate of variance for the estimate Y_h , of the characteristic of interest for a specific stratum was calculated based on a random group estimator and is given by

Table 11. Sample Design for Precanvass Evaluation

| Stratum number | Stratum description | Number of district offices in stratum | Number of district offices in sample |
|----------------|---|---------------------------------------|--------------------------------------|
| | Total..... | 409 | 43 |
| I | Centralized district offices in a city with 1,000,000 or more persons..... | 39 | 8 |
| II | Balance of centralized district offices..... | 48 | 8 |
| III | Decentralized district offices without Prelist Recanvass Operation..... | 194 | 17 |
| IV | Decentralized district offices with Prelist Recanvass Operation--Urban..... | 67 | 7 |
| V | Decentralized district offices with Prelist Recanvass Operation--Rural..... | 25 | 0 |
| VI | Conventional and two-procedure district offices..... | 36 | 3 |

$$\hat{V}_h(\hat{Y}_h) = \frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} \left[Y_{hi}^{(w)} - \frac{\sum_{i=1}^{n_h} Y_{hi}^{(w)}}{n_h} \right]^2$$

where

n_h is the number of sample DOs in the h th stratum, and

$Y_{hi}^{(w)}$ is the weighted total of characteristic in the i th sample DO in the h th stratum.

$$Y_{hi}^{(w)} = \sum_{j=1}^{M_{hi}} W_{hi} Y_{hij}$$

EVALUATION METHODOLOGY

The procedures used for the evaluation of the precavass operation involved matching the listings in the Precavass Address Register (PAR) against those in the Master Address Register (MAR). The results of matches were entered as codes into the PAR and the MAR. Briefly, the procedures for the evaluation were as follows:

1. Match yellow and blue cards against the listings in the sample ED MAR.

2. Identify the suppressed unit listing.
3. Identify potential adds to the PAR as one of the following three types:

- (i) Single unit basic address add.
- (ii) Multi-unit add within a multi-unit structure.
- (iii) Multi-unit basic address add.

4. Match adds in the sample ED PAR against listings in the sample ED MAR.
5. Match single unit or multi-unit basic address adds in the sample ED PAR against listings in neighboring ED MARs.
6. Match single unit or multi-unit basic address adds in the sample ED PAR against the Block Header Record, Form D-327, a printout from the Census Bureau geocoding programs.

7. Summarize the codes in the MAR and the PAR.

During the matching of the listing in the sample ED PAR against the sample ED MAR, the potential adds in the PAR were identified as one of three types of adds:

1. Single unit basic address add.

2. Multi-unit add within a multi-unit structure.
3. Multi-unit basic address add.

Within a sample ED, the adds (handwritten) which appeared in the MAR were classified as to the results of matching the listing in the sample ED PAR against the listings in sample ED MAR, and yellow and blue cards against the listings in the sample ED MAR into the following categories:

- 1) Precavass alone.
- 2) Both precavass and yellow and/or blue card.
- 3) Yellow and/or blue card.
- 4) Unknown—other than categories 1 through 3.

The adds in the MAR from categories 1 and 2 were matched to the 1980 census computer records to obtain the number and the demographic characteristics of those persons enumerated in units added by the precavass operation.

Chapter 4. 1980 Census Casual Count Operation

INTRODUCTION AND BACKGROUND

The purpose of the casual count operation was to enumerate highly transient individuals who were not counted by regular census enumeration procedures. Such individuals were thought to have no permanent place of residence or were thought to live at several places and would have to be counted wherever they were located.

The casual count was conducted midway through the 1980 census taking process, and consisted of sending census enumerators to places where transient individuals were expected to frequent. The census enumerators then attempted to contact these persons and determine whether they had been enumerated. Those persons found not to have been previously enumerated were added to the census. The casual count was done only in the most urban portions of the United States and was estimated to have added about 13,000 persons to the census.

Prior to the 1980 census, the first major attempt at this type of approach was the 1970 Census Aggressive Missed Persons Campaign [1]. For this procedure, the Census Bureau attempted to enlist the aid of local community organizations to distribute cards in places where transient individuals were thought to congregate. This program was unsuccessful, primarily because the local organizations lacked the resources to conduct this campaign. Thus, in planning for the 1980 census, procedures based on the utilization of census personnel were tested, and the 1980 procedure described above was developed [2].

The 1980 census casual count procedures were carried out in those 1980

census district offices in the central portions of large cities. A brief description of the operation used is as follows:

1980 Census Field Procedures

As described above, the casual count field work took place about midway through the census process. Teams consisting of two census enumerators were given a list of places to visit. These places consisted of bus and train stations, welfare and unemployment offices, street corners, and other such places where transient persons might be. Teams of enumerators were used for safety and efficiency, since the enumerators visited the places on their list at the busiest times. Once at a place, the enumerators were to ask persons who appeared to be at least 15 years old if their place of residence was in the city where the interview was being conducted. (No action was taken for persons living outside of the city.) For persons who said that they lived in the city *and* that they had not been counted, the enumerator completed an Individual Census Report (facsimile B, shown at the end of this chapter). The enumerators also recorded the place of residence for the individuals on the Individual Census Report; "No Residence" was recorded for persons with no usual place of residence.

1980 Census District Office Procedures

In the census district offices, office clerks examined the returned Individual Census Reports. Those reports for persons with no usual residence were added to the census in the census block where the interview had taken place. Those Individual Census Reports with a usual place of

residence were matched to the census to see if the person had been previously enumerated without their knowledge. Those persons not found in the census were also added.

RESULTS

The 1980 census casual count procedure was evaluated based on a sample of materials saved from the 1980 census as described in the Appendix to this chapter. It was estimated that a total of about 13,000 persons were added to the census; it was also estimated that the standard error of this total was about 7,600. Clearly, the casual count operation did not have a significant impact on the 1980 census counts.

It was also estimated that the casual count operation cost about \$246,000. Thus, it cost about \$18.60 for each person added to the census from the casual count procedure. It should be noted that the largest portion of this amount, about \$221,000 was spent on payment of field enumerators.

Finally, the evaluation of the casual count operation indicated that census workers had experienced great difficulty in conducting the office procedures associated with making the casual count additions. This probably resulted from the large amount of office work associated with making a casual count addition to the census. This work included sorting forms, geocoding addresses received for usual place of residence, transcribing information from one form to another, and matching records. These operations were conducted clerically in the 1980 census, and were thus subject to processing errors.

CONCLUSIONS

The impact of the casual count on the 1980 census was minimal. Even if the 1980 census office operations had been applied perfectly, it is doubtful that the number of casual count adds would have doubled. It could be that the lists of places where casual count enumerators were sent were incomplete and that many transient individuals were in other locations at the time of casual count. It could also be that there weren't very many transient persons eligible to be counted by the casual count operation.

More careful control of census operations for processing can be studied such

as automated control of the casual count enumerator returns. While this approach will improve the efficiency of the operation, it is doubtful that it will result in a significant cost saving since most of the money spent in 1980 went to pay field enumerator salaries. It is also doubtful that an automated approach will significantly increase the impact of the casual count operation on the census.

The casual count operation as used in the 1980 census was targeted at a very specific segment of the population. The problems and issues relating to the enumeration of these persons in future censuses is being carefully considered by the Census Bureau.

REFERENCES

- [1] U.S. Bureau of the Census, Census of Population and Housing: 1970 Evaluation and Research Program PHC(E)-6, *Effect of Special Procedures to Improve the Coverage of the 1970 Census*, 1974.
- [2] Lord, Sandra S., Internal Census Bureau Memorandum, *A History of the Casual Count Operation and a Proposal for a Casual Count Post Censal Evaluation*, August 15, 1978.

FACSIMILE B. INDIVIDUAL CENSUS REPORT, FORM D-20



U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

1980 CENSUS OF THE UNITED STATES
INDIVIDUAL CENSUS REPORT

1. What is your name? (Please print)

(Last name) (First name) (Middle initial)

2. Are you — (Mark the first box that applies)

- a. ☐ A person who usually lives here or who stays here most of the week while working?
- b. ☐ A college student living here while attending college?
- c. ☐ A patient or resident of an institution such as a home for the aged or mental hospital?
- d. ☐ A person with no usual place of residence?
- e. ☐ A person for whom there is no one at your home address to report you to a census taker? — Give the address at which you usually live.

Please continue on page 2

| | |
|-----------------------------|----------|
| HOUSE NO., STREET, APT. NO. | |
| RURAL ROUTE NO. | BOX NO. |
| CITY | |
| COUNTY | |
| STATE | ZIP CODE |
| TELEPHONE NUMBER | |

If you did not mark any of the boxes above, please mark this box ☐ and return the form without answering the remaining questions.

| FOR CENSUS OFFICE USE | | | |
|-----------------------|-------------|-----------|--------------------------|
| D.O. NO. | INITIAL ED. | BLOCK NO. | |
| SERIAL NO. | SEARCH ED. | | |
| | CONTROL NO. | PD. | <input type="checkbox"/> |
| | | AD. | <input type="checkbox"/> |

FORM D-20

Form Approved: O.M.B. No. 41-S78006

3. Sex

☐ Male ☐ Female

4. Are you —

(Mark one box.)

- ☐ White ☐ Asian Indian
- ☐ Black or Negro ☐ Hawaiian
- ☐ Japanese ☐ Guamanian
- ☐ Chinese ☐ Samoan
- ☐ Filipino ☐ Eskimo
- ☐ Korean ☐ Aleut
- ☐ Vietnamese ☐ Other — Specify X
- ☐ Indian (Amer.)
Print tribe X

5. When were you born?

Month _____ Year _____

6. Marital status

(Mark one box.)

- ☐ Now married ☐ Separated
- ☐ Widowed ☐ Never married
- ☐ Divorced

7. Are you of Spanish/Hispanic origin or descent?

(Mark one box.)

- ☐ No (not Spanish/Hispanic)
- ☐ Yes, Mexican, Mexican-Amer., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, other Spanish/Hispanic

8. Since February 1, 1980 have you attended regular school or college at any time? Mark one box.

Count nursery school, kindergarten, elementary school and schooling which leads to a high school diploma or college degree.

- ☐ No, have not attended since February 1
- ☐ Yes, public school, public college
- ☐ Yes, private, church-related
- ☐ Yes, private, not church-related

9. What is the highest grade (or year) of regular school you have ever attended? Mark one box.

If now attending school, mark the grade you are now in.
If high school was finished by equivalency test (GED), mark "12."

☐ Nursery school ☐ Kindergarten

Elementary through high school (grade or year)

1 2 3 4 5 6 7 8 9 10 11 12

College (academic year)

1 2 3 4 5 6 7 8 or more

☐ Never attended school — Skip to 11

10. Did you finish the highest grade (or year) attended?

Mark one box.

- ☐ Now attending this grade (or year)
- ☐ Finished this grade (or year)
- ☐ Did not finish this grade (or year)

11. In what State or foreign country were you born?

Print the State where your mother was living when you were born. Do not give the location of the hospital unless your mother's home and the hospital were in the same State.

Name of State or foreign country, or Puerto Rico, Guam, etc.

12. If you were born in a foreign country —

a. Are you a naturalized citizen of the United States?

- ☐ Yes, a naturalized citizen
- ☐ No, not a citizen
- ☐ Born abroad of American parents

b. When did you come to the United States to stay?

- ☐ 1975 to 1980 ☐ 1965 to 1969 ☐ 1950 to 1959
- ☐ 1970 to 1974 ☐ 1960 to 1964 ☐ Before 1950

13a. Do you speak a language other than English at home?

- ☐ Yes ☐ No, only speak English — Skip to 14

b. What is this language?

(For example — Chinese, Italian, Spanish, etc.)

c. How well do you speak English?

- ☐ Very well ☐ Not well
- ☐ Well ☐ Not at all

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FACSIMILE B. INDIVIDUAL CENSUS REPORT, FORM D-20—Con.

| | | |
|---|--|---|
| <p>14. What is your ancestry?</p> <p>(For example — Afro-Amer., English, French, German, Honduran, Hungarian, Irish, Italian, Jamaican, Korean, Lebanese, Mexican, Nigerian, Polish, Ukrainian, Venezuelan, etc.)</p> | <p>19. Do you have a physical, mental, or other health condition which has lasted for 6 or more months and which . . . Yes No</p> <p>a. Limits the kind or amount of work you can do at a job? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>b. Prevents you from working at a job? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>c. Limits or prevents you from using public transportation? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> | <p>24a. Last week, how long did it usually take you to get from home to work (one way)?</p> <p>----- Minutes</p> |
| <p>15a. Did you live in this house five years ago (April 1, 1975)?</p> <p>If in college or Armed Forces in April 1975, report place of residence there.</p> <p><input type="checkbox"/> Born April 1975 or later — Skip the rest of the questions; see instructions at bottom of page 8.</p> <p><input type="checkbox"/> Yes, this house — Skip to 16</p> <p><input type="checkbox"/> No, different house</p> | <p>20. If you are female —</p> <p>How many babies have you ever had, not counting stillbirths? Do not count stepchildren or children you have adopted.</p> <p><input type="checkbox"/> None <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 or more</p> | <p>b. How did you usually get to work last week?</p> <p>If you used more than one method, give the one usually used for most of the distance.</p> <p><input type="checkbox"/> Car <input type="checkbox"/> Taxicab</p> <p><input type="checkbox"/> Truck <input type="checkbox"/> Motorcycle</p> <p><input type="checkbox"/> Van <input type="checkbox"/> Bicycle</p> <p><input type="checkbox"/> Bus or streetcar <input type="checkbox"/> Walked only</p> <p><input type="checkbox"/> Railroad <input type="checkbox"/> Worked at home</p> <p><input type="checkbox"/> Subway or elevated <input type="checkbox"/> Other — Specify _____</p> |
| <p>b. Where did you live five years ago (April 1, 1975)?</p> <p>(1) State, foreign country, Puerto Rico, Guam, etc.: _____</p> <p>(2) County: _____</p> <p>(3) City, town, village, etc.: _____</p> <p>(4) Inside the incorporated (legal) limits of that city, town, village, etc.?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No, in unincorporated area</p> | <p>21. If you have ever been married —</p> <p>a. Have you been married more than once?</p> <p><input type="checkbox"/> Once <input type="checkbox"/> More than once</p> <p>b. Month and year of marriage? Month and year of first marriage?</p> <p>(Month) (Year) (Month) (Year)</p> <p>c. If married more than once — Did your first marriage end because of the death of your husband (or wife)?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> | <p>If car, truck, or van in 24b, go to 24c. Otherwise, skip to 28.</p> <p>c. When going to work last week, did you usually —</p> <p><input type="checkbox"/> Drive alone — Skip to 28 <input type="checkbox"/> Drive others only</p> <p><input type="checkbox"/> Share driving <input type="checkbox"/> Ride as passenger only</p> <p>d. How many people, including yourself, usually rode to work in the car, truck, or van last week?</p> <p><input type="checkbox"/> 2 <input type="checkbox"/> 4 <input type="checkbox"/> 6</p> <p><input type="checkbox"/> 3 <input type="checkbox"/> 5 <input type="checkbox"/> 7 or more</p> <p>After answering 24d, skip to 28.</p> |
| <p>16. Were you —</p> <p><input type="checkbox"/> Born before April 1965 — Please go on with questions 17–33.</p> <p><input type="checkbox"/> Born April 1965 or later — Skip the rest of the questions; see instructions at bottom of page 8.</p> | <p>22a. Did you work at any time last week?</p> <p><input type="checkbox"/> Yes — Mark this box if you worked full time or part time. (Count part-time work such as delivering papers, or helping without pay in a family business or farm. Also count active duty in the Armed Forces.)</p> <p><input type="checkbox"/> No — Mark this box if you did not work, or did only own housework, school work, or volunteer work.</p> <p>Skip to 25</p> | <p>25. Were you temporarily absent or on layoff from a job or business last week?</p> <p><input type="checkbox"/> Yes, on layoff</p> <p><input type="checkbox"/> Yes, on vacation, temporary illness, labor dispute, etc.</p> <p><input type="checkbox"/> No</p> |
| <p>17. In April 1975 (five years ago) were you —</p> <p>a. On active duty in the Armed Forces?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>b. Attending college?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>c. Working at a job or business?</p> <p><input type="checkbox"/> Yes, full time <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, part time</p> | <p>b. How many hours did you work last week (at all jobs)?</p> <p>Subtract any time off, add overtime or extra hours worked.</p> <p>----- Hours</p> | <p>26. Have you been looking for work during the last 4 weeks?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No — Skip to 27</p> |
| <p>18a. Are you a veteran of active-duty military service in the Armed Forces of the United States?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No — Skip to 19</p> | <p>23. At what location did you work last week? If you worked at more than one location, print where you worked most last week.</p> <p>a. Address (Number and street) _____</p> <p>If street address is not known, enter the building name, shopping center, or other physical location description.</p> | <p>b. Could you have taken a job last week?</p> <p><input type="checkbox"/> No, already have a job</p> <p><input type="checkbox"/> No, temporarily ill</p> <p><input type="checkbox"/> No, other reasons (in school, etc.)</p> <p><input type="checkbox"/> Yes, could have taken a job</p> |
| <p>b. Was active-duty military service during — (Mark a box for each period in which you served.)</p> <p><input type="checkbox"/> May 1975 or later</p> <p><input type="checkbox"/> Vietnam era (August 1964–April 1975)</p> <p><input type="checkbox"/> February 1955–July 1964</p> <p><input type="checkbox"/> Korean conflict (June 1950–January 1955)</p> <p><input type="checkbox"/> World War II (September 1940–July 1947)</p> <p><input type="checkbox"/> World War I (April 1917–November 1918)</p> <p><input type="checkbox"/> Any other time</p> | <p>b. City, town, village, borough, etc. _____</p> <p>c. Is the place of work inside the incorporated (legal) limits of that city, town, village, borough, etc.?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No, in unincorporated area</p> <p>d. County _____</p> <p>e. State _____ f. ZIP Code _____</p> | <p>27. When did you last work, even for a few days?</p> <p><input type="checkbox"/> 1980 <input type="checkbox"/> 1978 <input type="checkbox"/> 1970 to 1974</p> <p><input type="checkbox"/> 1979 <input type="checkbox"/> 1975 to 1977 <input type="checkbox"/> 1969 or earlier</p> <p><input type="checkbox"/> Never worked</p> <p>Skip to 31a</p> |

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FACSIMILE B. INDIVIDUAL CENSUS REPORT, FORM D-20—Con.

| | |
|--|---|
| <p>28-30. Current or most recent job activity Describe clearly your chief job activity or business last week. If you had more than one job, describe the one at which you worked the most hours. If you had no job or business last week, give information for last job or business since 1975.</p> <p>28. Industry a. For whom did you work? If now on active duty in the Armed Forces, print "AF" and skip to question 31. _____ (Name of company, business, organization, or other employer)</p> <p>b. What kind of business or industry was this? Describe the activity at location where employed. _____ (For example: Hospital, newspaper publishing, mail order house, auto engine manufacturing, breakfast cereal manufacturing)</p> <p>c. Is this mainly — (Mark one box) <input type="checkbox"/> Manufacturing <input type="checkbox"/> Retail trade <input type="checkbox"/> Wholesale trade <input type="checkbox"/> Other (agriculture, construction, service, government, etc.)</p> <p>29. Occupation a. What kind of work were you doing? _____ (For example: Registered nurse, personnel manager, supervisor of order clerks, gasoline engine assembler, grinder operator)</p> <p>b. What were your most important activities or duties? _____ (For example: Patient care, directing hiring policies, supervising order clerks, assembling engines, operating grinding mill)</p> <p>30. Were you — (Mark one box) Employee of private company, business, or individual, for wages, salary, or commissions <input type="checkbox"/> Federal government employee <input type="checkbox"/> State government employee <input type="checkbox"/> Local government employee (City, county, etc.) <input type="checkbox"/> Self-employed in own business, professional practice, or farm — Own business not incorporated <input type="checkbox"/> Own business incorporated <input type="checkbox"/> Working without pay in family business or farm <input type="checkbox"/></p> <p>31a. Last year (1979), did you work, even for a few days, at a paid job or in a business or farm? <input type="checkbox"/> Yes <input type="checkbox"/> No — Skip to 31d</p> <p>b. How many weeks did you work in 1979? Count paid vacation, paid sick leave, and military service. _____ Weeks</p> <p>c. During the weeks worked in 1979, how many hours did you usually work each week? _____ Hours</p> <p>d. Of the weeks not worked in 1979 (if any), how many weeks were you looking for work or on layoff from a job? _____ Weeks</p> | <p>32. Income in 1979 — Mark boxes and print dollar amounts. If net income was a loss, write "Loss" above the dollar amount. If exact amount is not known, give best estimate.</p> <p>During 1979 did you receive any income from the following sources? If "Yes" to any of the sources below — How much did you receive for the entire year?</p> <p>a. Wages, salary, commissions, bonuses, or tips from all jobs . . . Report amount before deductions for taxes, bonds, dues, or other items. <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>b. Own nonfarm business, partnership, or professional practice . . . Report net income after business expenses. <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>c. Own farm . . . Report net income after operating expenses. Include earnings as a tenant farmer or sharecropper. <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>d. Interest, dividends, royalties, or net rental income . . . Report even small amounts credited to an account. <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>e. Social Security or Railroad Retirement . . . <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>f. Supplemental Security (SSI), Aid to Families with Dependent Children (AFDC), or other public assistance or public welfare payments . . . <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>g. Unemployment compensation, veterans' payments, pensions, alimony or child support, or any other sources of income received regularly . . . Exclude lump-sum payments such as money from an inheritance or the sale of a home. <input type="checkbox"/> Yes ————— \$ _____ .00 <input type="checkbox"/> No (Annual amount — Dollars)</p> <p>33. What was your total income in 1979? \$ _____ .00 OR <input type="checkbox"/> None (Annual amount — Dollars) Add entries in questions 32a through g; subtract any losses. If total amount was a loss, write "Loss" above amount.</p> <p>AFTER COMPLETING THIS FORM — 1. Please check it to be sure you have answered all the required questions completely. 2. To return your form, please follow the instructions on the envelope that the form came in. Thank you for your cooperation.</p> |
|--|---|

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Appendix 4. Sample Design, Estimation, and Evaluation Methodology

SAMPLE DESIGN

For the evaluation of the casual count operation, those 1980 census District Offices in which the casual count operation was conducted were divided into two strata, I and II, which correspond to the first two strata described for the Post Office evaluation in chapter 2. Stratum I was composed of those centralized district offices in cities with more than 1,000,000 persons, and Stratum II was the remainder of the centralized district offices in the highly urban portions of the country. The strata contained 39 and 48 district offices, respectively. A simple random sample without replacement of size 8 and 9 was selected from Strata I and II, respectively. The materials used for the casual count operation in these district offices were saved for this evaluation.

ESTIMATION

Estimates of the number of casual count

adds were obtained by multiplying the number of adds found by the evaluation procedure, described below, for a sample district office by the inverse of the selection probability for the district office. Estimates of the variance of the number of adds were calculated as \hat{V} where

$$\hat{V} = \sum_{h=1}^2 n_h \left(\frac{1-n_h}{N_h} \right) \sum_{i=1}^{n_h} \left[\frac{Y_{hi} - \sum_{i=1}^{n_h} \frac{Y_{hi}}{n_h}}{n_h - 1} \right]^2$$

where,

Y_{hi} denotes the weighted estimate of total adds from the i^{th} district in the h^{th} stratum.

Note: $Y_{hi} = \frac{N_h}{n_h} y_{hi}$, for

y_{hi} the unweighted number of adds found for the i^{th} sample district office in the h^{th} stratum.

N_h denotes the number of district offices in the h^{th} stratum.

n_h denotes the number of sample district offices in the h^{th} stratum.

EVALUATION METHODOLOGY

For this evaluation, the materials saved for the sample district offices were clerically examined. The 1980 census casual count district office procedures were redone for these materials. This work included a match to the 1980 census files to see if persons who should have been added actually were. Those persons found to have been added by the casual count procedure were identified and counted.

This clerical review also uncovered a number of errors which had been made by the 1980 census office workers. This was undoubtedly due, in part, to the complexity of procedures that the office workers were required to follow in order to "correctly" add a casual count person.

Chapter 5. 1980 Census Questionnaire Coverage Items and Dependent Roster Checks

INTRODUCTION AND BACKGROUND

The 1980 census questionnaire contained several questions which were designed to improve coverage based on an edit, and a subsequent followup at households for those questionnaires which failed this edit. The dependent roster check was employed at many households for which a census questionnaire followup occurred for any reason. For these households, the roster on the questionnaire was read, and the household respondent was asked if anyone else had been living at the house on census day.

The census questionnaire coverage questions consisted of questions Q1, H1, H2, H3, and H4. Question Q1 was the first question on the census questionnaire, and asked for the household roster. The edit of Q1 consisted of determining if more names were listed in Q1 than appeared on the inside of the questionnaire, or if the questionnaire was entirely filled. If either of these situations occurred, the

questionnaire failed edit and was sent to followup.

Facsimiles of questions H1, H2, H3, and H4 are shown below.

Questions H1 and H3 asked the respondent to list additional persons whom they may not have included on the questionnaire, but possibly should have. A review of these responses would in some instances reveal a person who should have been included on the questionnaire. A followup subsequently was conducted for these cases in order to enumerate the missed person. Question H2 asked about listed persons who, perhaps, should not be included. The followup for question H2 verified the enumeration status of potential erroneous enumerations.

Question H4 asked respondents the number of units in the structure in which they resided. By comparing the number of housing units given in the respondent's answer to the number of units in the census records for the structure, small multi-unit structures with missing housing units could be detected.

The evaluation of these coverage questions was limited to a study of the H4 question. This was because materials needed to evaluate the other questions were not complete enough to provide meaningful results. The evaluation of H4 resulted in an estimate of approximately 93,000 housing units which were added to census as a result of a followup for questionnaires which failed the H4 edit. This resulted in an improvement to the housing unit counts of 0.1 percent. This question was also used during the 1970 Census, and resulted in the addition of about 126,000 housing units or about 0.2 percent.

The edit of question H4 took place in all 1980 census district offices. However,

due to the limitations of the data on which this evaluation was based, only estimates for census areas where the mail-out/mail-back procedure was used were produced (95 percent of the population lived in these areas). The edit procedure for these areas was as follows:

A label on the cover of the census questionnaire indicated the number of questionnaires that had been mailed to units with the same basic street address. When the mail return questionnaires were checked-in, the answer to question H4 was compared to the number on the front of the questionnaire. If the answer to H4 was larger than this number, the census check-in clerk then checked the 1980 Census Master Address Register. The Master Address Register had all the addresses which had been included in the census for the basic address for which editing was being carried out. The clerk then counted up the number of units for the basic address in the Master Address Register, and compared this number to the H4 answer. If the H4 answer was still larger, then the census questionnaire failed edit and was sent to followup.

It should be noted that for structures with more than 10 units, the H4 edit was not conducted. This rule was adopted since it was not feasible to conduct the edit or the followup in larger structures. It was also thought that the coverage error that the H4 edit could correct occurred in smaller size structures.

During followup, enumerators determined how many units were actually at the basic address, and added any missed units.

| |
|---|
| <p>H1. Did you leave anyone out of Question 1 because you were not sure if the person should be listed — for example, a new baby still in the hospital, a lodger who also has another home, or a person who stays here once in a while and has no other home?</p> <p><input type="radio"/> Yes — On page 20 give name(s) and reason left out.</p> <p><input type="radio"/> No</p> |
| <p>H2. Did you list anyone in Question 1 who is away from home now — for example, on a vacation or in a hospital?</p> <p><input type="radio"/> Yes — On page 20 give name(s) and reason person is away.</p> <p><input type="radio"/> No</p> |
| <p>H3. Is anyone visiting here who is not already listed?</p> <p><input type="radio"/> Yes — On page 20 give name of each visitor for whom there is no one at the home address to report the person to a census taker.</p> <p><input type="radio"/> No</p> |
| <p>H4. How many living quarters, occupied and vacant, are at this address?</p> <p><input type="radio"/> One</p> <p><input type="radio"/> 2 apartments or living quarters</p> <p><input type="radio"/> 3 apartments or living quarters</p> <p><input type="radio"/> 4 apartments or living quarters</p> <p><input type="radio"/> 5 apartments or living quarters</p> <p><input type="radio"/> 6 apartments or living quarters</p> <p><input type="radio"/> 7 apartments or living quarters</p> <p><input type="radio"/> 8 apartments or living quarters</p> <p><input type="radio"/> 9 apartments or living quarters</p> <p><input type="radio"/> 10 or more apartments or living quarters</p> <p><input type="radio"/> This is a mobile home or trailer</p> |

RESULTS

The data given in this section are estimates obtained by review of a sample of materials saved from the 1980 Census. The sample design and estimation procedures are described in the appendix to this chapter. Additionally, for each of the estimated totals in this section, an estimated standard error is given in parenthesis.

The evaluation of the H-4 procedure indicated that an estimated 93,000 (30,000) units were added to the census by the H4 procedure, representing an improvement in the housing unit count of about 0.1 of 1 percent. Among the households mailing back their census questionnaires, about 2,120,000 (231,000) addresses were followed-up as a result of having failed H4 edit. Of these 2,120,000 addresses, 1,232,000 (136,000) units were single units and 704,000 (127,000) were multiunit structures. The size of structure could not be determined for the additional estimated 184,000 (36,000) of these addresses because of a lack of sufficient address information.

Of the 1,232,000 single units that failed the H4 edit, an estimated 50,000 (24,000) units were added at these addresses. Of the 704,000 multiunit structures, 22,000 (7,000) addresses were added at these addresses. At some of the addresses more than one unit was added resulting in the total of 93,000 units.

There are no exact costs for the H4 operation from the census; however, it can be estimated that the entire H4 opera-

tion cost about \$7.5 million to carry out. This estimate was derived by breaking the H4 operation into two phases, the editing and followup phases, and estimating component costs. For the editing phase, it was assumed that the H4 edit of all census questionnaires cost about 30 percent of the total check-in and editing costs, or about \$4 million. For the second phase, the H4 followup, it was assumed that of 2,140,000 addresses that failed H4 edit, half went to personal visit followup and the other half to telephone followup only. For telephone followup this would mean 1,070,000 calls or roughly \$500,000. For personal visit followup, the cost is estimated at about \$3 million.

It should be noted that the H4 editing costs are extremely high since this operation was done as part of the operations where the census questionnaires were checked-in at the district offices. The costs would have been much less if the H4 edit could have been done during the other editing operations that were conducted. However, the only time during the census process at which all materials necessary to do the H4 edit were available was during the check-in.

CONCLUSIONS

As the evidence above points out for both 1970 and 1980, the amount of coverage improvement gained from H4 has been minimal. There are a number of potential reasons for this, some of which are as follows:

1. The H4 edit may be difficult to carry out.
2. The H4 question may be difficult for respondents to understand.
3. It may be that by the time the H4 followup is done there may be very few housing units which are missed. The H4 followup occurs late in the census process, and well after the major address list update procedures have been undertaken. The H4 edit may not be efficient in identifying the residual missed housing units.

From an operational view, there is evidence that respondents had difficulty answering the H4 question and/or there were many editing problems experienced by census office clerks. In the above estimates, it can be seen that of the estimated 1,232,000 single units that failed the H4 edit, 1,182,000 remained single units and likewise of the 704,000 multiunit structures that failed the H4 edit, 682,000 received no added units. Collectively, 96 percent of the units that failed the H4 edit had no added units. This evaluation was not able to distinguish whether the low payoff of H4 edit failure was due to any one of the three causes stated above. In planning for the 1990 Census, the Census Bureau is investigating ways in which the office edits can be automated. This could result in a substantial cost savings for this operation. The effective payoff of the H4 edit question as well as the other coverage questions are being carefully studied during the 1990 Test Census cycle.

Appendix 5. Sample Design, Estimation, and Evaluation Methodology

The evaluation of the effectiveness of the H4 question was based on examining a sample of 1980 census questionnaires and the corresponding Master Address Registers. The source of data for this evaluation was a sample of 260 census enumeration districts (ED's) for which the questionnaires had been returned. An ED is a small area which does not cross any boundaries recognized by the Census Bureau. ED's were designed so as to have about 300 to 600 housing units.

The sample of ED's was systematically selected at the rate of 1 in 1,000 from the universe of all ED's in the mail census. Thus, the estimates from this evaluation only represent the mail census area. However, this represents about 95 percent of the population.

The evaluation proceeded by clerically reviewing the census questionnaires in the 260 sample ED's. The questionnaires marked as having failed the H4 edit were matched to the census Master Address

Registers to determine if any housing units had been added from a H4 followup. It should be noted that 230 of the sample ED's had no H4 adds.

Estimates for this study were produced by weighting the sample ED tallies by the inverse of their probability of selection (1 in 1,000) and summing over all ED's. Sampling errors were produced for all estimates by assuming simple random sampling and using the same estimator as in the appendix to chapter 4.

Chapter 6. Whole Household Usual Home Elsewhere

INTRODUCTION AND BACKGROUND

For the 1980 census, Whole Household Usual Home Elsewhere (WHUHE) households were defined as housing units occupied entirely by persons who had a usual residence elsewhere. WHUHE's would have included vacation cottages, rental homes, and other housing units where all persons had been temporarily staying at the time of the census. Under the 1980 census procedures, persons found in WHUHE housing units were to be counted at their usual place of residence. The WHUHE housing unit was, thus, to be counted as a vacant unit.

The procedure employed by the Census Bureau to count persons found in WHUHE units was based on a clearinghouse approach. The 1980 Census WHUHE procedure required respondents or followup enumerators to mark a box on page 1 of the census questionnaire if everyone in the housing unit had a usual residence elsewhere. These respondents were also required to record their alternate address on the back of the census questionnaire. Questionnaires identified for WHUHE units (either mail return or enumerator follow-up) were transcribed to new questionnaires. The persons on the original questionnaire were cancelled, and this questionnaire was processed as a vacant unit. When processing the census questionnaire, a circle on the interior of the questionnaire was filled to indicate that the questionnaire was for a vacant household with persons in it who had a usual residence elsewhere. The new questionnaires underwent a preliminary search in the census district office, and if it was determined that the questionnaires were for an address outside of the district office boundary, they were sent to a clear-

inghouse. At the clearinghouse, the WHUHE questionnaires were coded to a census district office and sent to that office. When the district offices received WHUHE questionnaires from the clearinghouse, a search through the office files took place to determine if the persons had already been counted. If the WHUHE persons were found *not* to have been counted, they were added at their usual place of residence, unless it was found to correspond to a vacant housing unit. WHUHE persons were not added to vacant units, since it was felt that the followup of vacant and deleted housing units (chapter 8) would pick up these persons.

The evaluation of the WHUHE procedures was based on a review of a sample of census materials. The evaluation found that during the 1980 census, at most 1,000,000 persons were reallo-

cated via the WHUHE operation, and that of these about 200,000 were counted in at least two places. The evaluation also found that census clerks and enumerators had great difficulty in recognizing, coding, and correctly processing persons found in WHUHE units.

RESULTS

The following analysis is based on estimates that were produced from the sample of census questionnaires described in the appendix to this chapter.

From the estimates in table 12, it can be seen that there are an estimated 642,000 WHUHE's as determined by the "UHE Box" on page 1 of census questionnaires. Among these units, it may be noted that 441,000 reported an alternate address for a usual residence elsewhere

Table 12. Households Classified as WHUHE for Census Questionnaire Coding Status by Final Census Processing Status

(Numbers in thousands)

| Census questionnaire coding status | Final census processing status | | | | |
|--|--------------------------------|--|-----------------------------------|--|---|
| | Total | Status of persons initially recorded on WHUHE questionnaires | | Status of alternate addresses reported | |
| | | All persons deleted in census | All persons not deleted in census | Alternate address reported | Alternate address reported and geocodable |
| Estimates: | | | | | |
| Total households..... | 642 | 225 | 417 | 441 | 402 |
| As coded inside census questionnaire: | | | | | |
| Vac UHE..... | 219 | 187 | 32 | 187 | 174 |
| Vac regular..... | 22 | 20 | 2 | 5 | 5 |
| Occupied..... | 374 | 6 | 368 | 233 | 209 |
| Not occupied..... | 27 | 12 | 15 | 16 | 14 |
| Standard errors of estimates given above: | | | | | |
| Total households..... | 90.9 | 67.8 | 39.7 | 77.9 | 73.9 |
| As coded inside census questionnaire: | | | | | |
| Vac UHE..... | 66.0 | 61.2 | 12.2 | 62.6 | 59.9 |
| Vac regular..... | 6.9 | 6.8 | 1.4 | 2.6 | 2.6 |
| Occupied..... | 36.0 | 2.8 | 35.5 | 28.8 | 26.6 |
| Not occupied..... | 7.7 | 6.6 | 3.9 | 5.5 | 4.7 |

and of these 402,000 were geocodable. This appears to indicate that either respondents in WHUHE's responded poorly in giving an alternate address or that not all of the 642,000 WHUHE's as coded in the "UHE Box" were real WHUHE's.

From table 12, it is possible to produce an estimate of the number of persons that were transferred to their usual address. Assuming that the 402,000 alternate addresses that were geocodable contained an average of 2.8 persons per occupied housing unit, it can be estimated that the WHUHE operation could have moved a maximum of 1,000,000 persons to their usual address. This estimate of 1,000,000 persons transferred by the WHUHE operation could be an overestimate. This follows since the 2.8 persons per housing unit figure used in computing the estimate of 1,000,000 persons transferred was the 1980 census national average household size for occupied housing units. If the households associated with the WHUHE units have a different household size, then the above estimate is in error. Census Bureau data from other sources [2], indicate that the average household size for WHUHE units could be lower than the 2.8 persons per

housing unit figure used above. In this regard, the estimate of 1,000,000 persons transferred by the WHUHE operation could be an overestimate. In addition, it could not be determined from this evaluation whether the WHUHE operation could have transferred these people or if the people had been enumerated at their usual residence by other census coverage improvement operations.

From table 12, it is also apparent that 417,000 WHUHE questionnaires contained persons that were not cancelled during the census process. The possibility for counting these persons twice, once on the WHUHE questionnaire and once at their alternate address was investigated. Of the 417,000 questionnaires with uncanceled persons, 232,000 had an alternate address which was geocodable. Table 13 shows the results of matching the uncanceled persons on the WHUHE questionnaire at these geocodable addresses. It was found that for these 232,000 geocodable alternative addresses, 214,000 persons were matched at their alternate address, thus these persons were enumerated at both addresses. However, the estimated 214,000 persons must be considered an understatement since all alternate addresses were not

geocodable. Whether these persons were duplicated because of the WHUHE operation or because they were not processed correctly through the WHUHE operation is again indeterminate from this study. What can be said, however, is that these persons were duplicated due to confusion within census operations concerning WHUHE's, either by not processing these forms through the WHUHE operation or processing them incorrectly.

During the census all households should have had occupancy status coded inside the census questionnaire in item B of the "For Census Use Only" portion of the questionnaire as shown below. According to census procedures for clerks and enumerators, if a questionnaire had the "UHE Box" checked on page 1 of the census questionnaire, the "Vacant UHE" circle should have been filled inside the census questionnaire. Table 1 gives evidence that census clerks and enumerators did not always code the inside of the census questionnaires correctly. Table 12 shows that out of the 642,000 WHUHE's that had the "UHE" Box checked on page 1 of the census questionnaire, only 219,000 were classified as "Vacant UHE" inside the census questionnaire, while 374,000 were coded "Occupied,"

Table 13. Households and Persons Within Households Classified as WHUHE Which Had Persons Not Deleted—Census Questionnaire Coding Status by Match Status at Alternative Address

(Numbers in thousands)

| Census questionnaire coding status | Match status of alternate addresses | | | | | |
|---|--|----------------------------------|------------------------------|---|--|--|
| | Match status for households with non-deleted persons | | | | Match status for non-deleted persons in households | |
| | Total | Alternate address not geocodable | Alternate address geocodable | Household match status at alternate address | | Persons matched at alternate address: duplicate enumerations |
| | | | | whole household match | Partial household match | |
| Estimates: | | | | | | |
| Total households..... | 417 | 185 | 232 | 84 | 25 | 1 211 214 |
| As coded inside census questionnaire: | | | | | | |
| Vac UHE..... | 32 | 12 | 20 | 13 | 0 | 57 23 |
| Vac regular..... | 2 | 1 | 1 | 1 | 0 | 5 4 |
| Occupied..... | 368 | 163 | 205 | 68 | 24 | 1 101 183 |
| Not occupied..... | 15 | 9 | 6 | 2 | 1 | 48 4 |
| Standard errors of estimates given above: | | | | | | |
| Total households..... | 39.7 | 23.5 | 28.2 | 15.3 | 5.4 | 114.1 33.0 |
| As coded inside census questionnaire: | | | | | | |
| Vac UHE..... | 12.2 | 4.5 | 8.6 | 5.9 | 0.0 | 17.5 9.5 |
| Vac regular..... | 1.4 | 1.0 | 1.0 | 1.0 | 0.0 | 4.1 4.0 |
| Occupied..... | 35.5 | 21.2 | 25.9 | 13.3 | 5.1 | 111.1 29.8 |
| Not occupied..... | 3.9 | 3.0 | 2.4 | 2.4 | 1.0 | 13.8 2.4 |

22,000 "Vacant Regular" and 27,000 were not coded at all. That is, about 66 percent of cases where the "UHE Box" on page 1 was checked did not have "Vacant UHE" checked inside the census questionnaire. It is not assumed that all 642,000 questionnaires that did have the "UHE Box" checked on page 1 were all WHUHE's, but there certainly appears to be a coding problem with these cases.

Finally, it should be noted that an alternative estimate of the total number of WHUHE's has been produced for the 1980 census [1]. This alternative estimate was obtained during the census processing in which all census questionnaires with the interior circle filled for vacant UHE were tallied. This procedure yielded an estimated 870,000 WHUHE's. This alternative estimate of 870,000 WHUHE's can be compared to the data shown in table 12. From table 12, it can be estimated that only about 220,000 questionnaires with the front marked to indicate WHUHE status were coded vacant UHE on the inside. The remaining 650,000 questionnaires tallied in the census thus did not have the front of the questionnaire marked. This gives additional evidence of the difficulty that both respondents and

census employees experienced in correctly identifying WHUHE's.

CONCLUSIONS

The success of the WHUHE operation in terms of correctly enumerating persons in the census at their usual address is indeterminate from this study. What can be said is, that, at best, the operation had the potential to transfer at most 1,000,000 persons in the census to their correct address. However, it could not be determined to what extent other census coverage improvement operations could also have contributed to the subsequent enumeration of these persons at their correct address. It was also found that by either not processing or misprocessing WHUHE's, a minimum of 214,000 persons were duplicated in the census.

There was also evidence to support the fact that census clerks and enumerators had a difficult time recognizing and processing WHUHE's and that they especially had a hard time coding the occupancy or vacancy status of WHUHE households.

In looking to the future, whether or not

a clearinghouse operation is used in 1990, the Census Bureau is investigating ways in which census clerks and enumerators can be more thoroughly drilled on the recognition and subsequent coding and processing of WHUHE's. In addition, alternate questions regarding residence are being studied. A person with more than one address at census time certainly has a higher chance of being enumerated more than once than those with only one address. Thus, the recognition and correct processing of these persons is essential to an accurate count. As an additional step more thorough quality control operations will be studied for implementation in the census offices for both WHUHE and occupancy status coding. This step could provide early warnings of possible processing problems with WHUHE's and reduce the possibility of double enumeration of WHUHE households.

REFERENCES

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[2] United States Bureau of the Census, U.S. Census of Population, 1980, Supplementary Reports, PC80-SI-6, *Nonpermanent Residents by States and Selected Counties and Incorporated Places: 1980*, April 1982.

| FOR CENSUS USE ONLY | | | | | |
|---|---|--|--|--|---|
| A4. Block number | A6. Serial number | B. Type of unit or quarters | For vacant units | D. Months vacant | F. Total persons |
| | | <u>Occupied</u> | <u>C1. Is this unit for —</u> | <input type="radio"/> Less than 1 month | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> First form | <input type="radio"/> Year round use | <input type="radio"/> 1 up to 2 months | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> Continuation | <input type="radio"/> Seasonal/Mig. — <i>Skip C2, C3, and D.</i> | <input type="radio"/> 2 up to 6 months | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <u>Vacant</u> | <u>C2. Vacancy status</u> | <input type="radio"/> 6 up to 12 months | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> Regular | <input type="radio"/> For rent | <input type="radio"/> 1 year up to 2 years | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> Usual home elsewhere | <input type="radio"/> For sale only | <input type="radio"/> 2 or more years | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <u>Group quarters</u> | <input type="radio"/> Rented or sold, not occupied | <u>E. Indicators</u> | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> First form | <input type="radio"/> Held for occasional use | 1. <input type="radio"/> <input type="radio"/> Mail return | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> | <input type="radio"/> Continuation | <input type="radio"/> Other vacant | 2. <input type="radio"/> <input type="radio"/> Pop./F | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| | | | <u>C3. Is this unit boarded up?</u> | <input type="radio"/> <input type="radio"/> | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| | | | <input type="radio"/> Yes <input type="radio"/> No | | |

Appendix 6. Evaluation Methodology

This analysis was based on a review of census questionnaires that were available from a sample of census materials. This sample was a systematic sample of census enumeration districts (ED's). Enumeration districts are defined to be geographic areas that do not cross any census boundaries. ED's are prepared so as to comprise an average of 300 housing units in urban areas and 600 housing units elsewhere.

For the sample, 284 ED's were selected, 260 ED's were in areas covered by the mail-out/mail-back census, and in each of these ED's, all the census questionnaires were saved from the 1980

census for evaluation purposes. The remaining 24 ED's were in conventional census offices and in these ED's the questionnaires were not saved after the 1980 census. These estimates are thus only representative of the mail census areas. It must be noted that the conventional census area only includes about 5 percent of the population.

To obtain estimates for this study, a clerical review was conducted to search the sample ED's and locate all the questionnaires that were checked as WHUHE in the "UHE Box" on page 1 of the questionnaire. These questionnaires then had household and alternate address informa-

tion transcribed to a worksheet. All alternate addresses were then geocoded, and all non-deleted persons in the WHUHE's, after geocoding was successful, were matched to the census records for the alternative address. Tallies were then produced by the ED in which the WHUHE originated.

Estimates were produced by weighting the ED tallies, by the inverse of the ED's probability of selection (1 in 1,000). Standard errors were then estimated by assuming simple random sampling and using the estimator given in the appendix to chapter 4.

Chapter 7. The 1980 Census Nonhousehold Sources Program

INTRODUCTION AND BACKGROUND

The objective of the 1980 Census Nonhousehold Sources Program was the reduction of differential undercoverage of minority populations. The program was based on matching independent lists of names and corresponding addresses to the 1980 Census during the actual enumeration in areas thought to contain minority populations. Persons determined not to have been enumerated were assigned for a followup procedure. Those persons found to have been missed by the census were subsequently enumerated.

The Nonhousehold Sources Program was a relatively new program for the 1980 Census, and was one of the few procedures directed at improving within household coverage. A very small version of this program was tested in the 1970 Census as the District of Columbia Drivers' License Test [1]. This test indicated that some success could be obtained from using drivers' licenses as an independent list source. However, the 1970 test was conducted on such a restricted basis that the results could not be generalized. The 1980 testing cycle thus included numerous tests of this procedure [2]. These results indicated that when drivers licenses were used as the independent list source, the increase to the census counts would be about 10 percent of the list. It was also determined that other lists containing persons who may be hard to enumerate could be used successfully in this program.

For the 1980 census, the Nonhousehold Sources Program was implemented using lists of names and addresses from the Department of Motor Vehicles, the U. S. Immigration and Naturalization Service,

and the 1979 New York City Public Assistance files. Furthermore, to facilitate the matching operations, the program was instituted in those areas where the Census Bureau could geocode addresses by computer. Thus, the program was restricted to the Tape Address Register portions of the country described in chapter 3. These areas contained most of the highly urban portions of the United States.

The basic procedures followed in conducting the Nonhousehold Sources Program are briefly described below.

First, the lists were processed by computer to eliminate out-of-scope and duplicate records. Out-of-scope records were those from census tracts with low precensus estimates of minority populations. This operation resulted in a total in-scope list size of approximately 6.8 million records. A label with name and address was printed for the in-scope records. The labels were then sent to the appropriate 1980 Census district office. In the district offices, each preprinted label was attached to a separate nonhousehold sources form (facsimile C, shown at the end of this chapter).

The district offices next matched the lists to the census records after the first followup of non-mail return questionnaires. The matching operation was performed by regular census office clerks. In order to keep the program cost reasonable, the matching phase was not designed to be an exhaustive matching and reconciliation procedure. The nonhousehold sources procedure was directed at screening the list to detect and enumerate persons who could efficiently be identified as missed by the census. Those cases involving extensive research and excessively expensive followup were dropped.

There were four stages of processing the nonhousehold sources cases in the district offices. First, the addresses were matched to the census Master Address Registers. A nonhousehold sources case was eliminated from further processing if:

1. The address was not found. These cases were dropped since the Nonhousehold Sources Program was directed at improving within household coverage. Many of the other programs described in this document were directed at improving whole household coverage. In addition, earlier tests [2] had indicated that the gain from processing these cases would be minimal.
2. The address was indicated to have matched to a vacant or deleted housing unit. These cases were dropped since the Census Bureau was to conduct a reinterview of all vacant and deleted housing units (chapter 8).
3. The address had no apartment designation and was found to match to a multi-unit structure with 10 or more units or the address had no apartment designation and was found to match to a multi-unit structure with nine or fewer units and the surname of the nonhousehold sources case could not be found in the census listings for the building. The early tests of the Nonhousehold Sources Program [2] had shown that the nonhousehold sources procedures could not be adapted to the complex situations involving research and followup in these structures.

During this first stage of processing, approximately 1.4 million addresses (20 percent of the lists) were eliminated from further processing leaving approximately

5.4 million addresses available for the second stage of processing.

The second stage of processing was an attempt to match each case to a census questionnaire. At this stage a case was eliminated from further processing if:

1. The census questionnaire was found and the nonhousehold sources person was already enumerated.
2. The census questionnaire was missing or was not filled out. Housing units corresponding to this type of questionnaire was already scheduled to be visited by an enumerator. The earlier testing for the Nonhousehold Sources Program had indicated that there was minimal payoff for conducting a nonhousehold sources interview at these households [2].

If the census questionnaire was found and the nonhousehold sources person was not already on it, the census roster and relationship, sex, race, date of birth, and Spanish/Hispanic origin for each person on the roster were entered on the Nonhousehold Sources Record form (facsimile C, shown at the end of this chapter).

The third stage was a followup interview conducted to determine whether or not the nonhousehold sources person should have been listed on the census questionnaire. The number of cases going to followup was approximately 1.8 million (27 percent of the lists).

The followup interviews were conducted by telephone whenever possible. If a household could not be contacted by telephone, a personal visit interview was conducted. If the respondent to the interview was the nonhousehold sources person or knew this person, the interviewer asked if the nonhousehold sources person had lived there on census day. If the person had lived there on census day, the person and his/her characteristics were added to the followup form. The followup enumerator was also instructed to determine if respondents at the households where the interview was being conducted were on the followup roster. In this event the interviewer checked for other missed persons at the household, and also added them to the followup form as needed.

The fourth and final stage was adding all missed persons enumerated during the followup to the appropriate census questionnaires in the district offices.

RESULTS

These results are estimates based on an analysis of a sample of materials saved from the 1980 census for evaluation. The appendix to this chapter describes the sample design evaluation and estimation procedures used to produce these data.

The following discussion of the Nonhousehold Sources Program will also distinguish between the two types of added persons. The two types of added persons are: 1) those whose names appeared on the nonhousehold sources lists—referred to as "Primary Adds"; and 2) those whose names were not on the lists, but who were enumerated as part of the nonhousehold sources followup—referred to as "Secondary Adds."

Overall Impact on the 1980 Census

The analysis of the nonhousehold sources data showed that about 127,000 persons were added to the census as a result of the nonhousehold sources program. Of

this total, 82,000 were persons whose names were on the nonhousehold sources lists, primary adds; and 45,000 were persons whose names did not appear on the lists but who resided at an address on the lists and were enumerated as part of the nonhousehold sources followup, i.e., secondary adds.

These persons represent approximately 1.2 and 0.7 percent, respectively, of the 6.8 million persons who were included on the nonhousehold sources lists. This results in a total yield of about 1.9 percent from processing these lists in the 1980 census. This result is substantially lower than the 1980 census test experiences had indicated. As mentioned above, it had been anticipated that the proportion of persons added during the 1980 census would be about 10 percent of the lists processed. This discrepancy between the results of the 1980 census nonhousehold sources program and the pretest expectations will be discussed in more detail below.

Demographic Characteristics of Persons Added to the Census

In examining the characteristics of persons added to the census by the Nonhousehold Sources Program, it becomes apparent that while the

Table 14. Estimated Sex and Race of Nonhousehold Sources Primary Adds and Percent Distribution of Total Primary Adds

(Standard errors in parenthesis)

| Race | Sex | | Total |
|----------------------------|----------|---------|----------|
| | Males | Females | |
| Total.....Number... | 54 632 | 26 888 | 81 520 |
| | (12 565) | (6 453) | (18 750) |
| Percent.. | 67.0 | 33.0 | 100.0 |
| | (15.4) | (7.9) | - |
| White.....Number... | 18 161 | 8 407 | 26 568 |
| | (4 177) | (2 270) | (6 376) |
| Percent.. | 22.3 | 10.3 | 32.6 |
| | (5.1) | (2.8) | (7.8) |
| Black.....Number... | 16 448 | 8 562 | 25 010 |
| | (2 796) | (2 055) | (4 752) |
| Percent.. | 20.2 | 10.5 | 30.7 |
| | (3.4) | (2.5) | (5.8) |
| Other.....Number... | 14 805 | 6 102 | 20 907 |
| | (7 699) | (2 807) | (11 081) |
| Percent.. | 18.1 | 7.5 | 25.6 |
| | (9.4) | (3.4) | (13.6) |
| Race unknown.....Number... | 5 218 | 3 817 | 9 035 |
| | (1 200) | (916) | (2 078) |
| Percent.. | 6.4 | 4.7 | 11.1 |
| | (1.5) | (1.1) | (2.6) |

- Means not applicable.

Table 15. Estimated Sex and Race of Nonhousehold Sources Secondary Adds and Percent Distribution of Total Secondary Adds

(Standard errors in parenthesis)

| Race | Sex | | Total |
|----------------------------|-------------------|-------------------|--------------------|
| | Males | Females | |
| Total.....Number... | 23 473 (5 399) | 21 855 (5 245) | 45 328 (10 425) |
| Percent.. | 51.8 (11.9) | 48.2 (11.6) | 100.0 - |
| White.....Number... | 8 949 (2 058) | 6 191 (1 672) | 15 140 (3 634) |
| Percent.. | 19.7 (4.5) | 13.7 (3.7) | 33.4 (8.0) |
| Black.....Number... | 6 568 (1 117) | 7 835 (1 880) | 13 953 (2 651) |
| Percent.. | 14.5 (2.5) | 16.3 (3.9) | 30.8 (5.9) |
| Other.....Number... | 6 739 (3 504) | 7 158 (4 581) | 13 897 (7 365) |
| Percent.. | 14.9 (7.7) | 15.8 (10.1) | 30.7 (16.3) |
| Race unknown.....Number... | 1 217 (280) | 1 121 (269) | 2 338 (538) |
| Percent.. | 2.7 (0.6) | 2.4 (0.6) | 5.1 (1.2) |

- Means not applicable.

Nonhousehold Sources Program did not add as many persons as was expected, it was very successful in adding persons in minority populations, specifically Black and Spanish/Hispanic.

The sex and race of the nonhousehold sources primary and secondary adds are given in tables 14 and 15. About 67 percent of the primary adds were males and 33 percent were female. For the secondary adds, approximately the same number of males and females were added. Additionally, for both primary and secondary adds, approximately the same proportion of Blacks and Whites were added.

Tables 16 and 17 display sex and Spanish/Hispanic origin for the primary and secondary adds. The proportion of Spanish/Hispanic persons is estimated as slightly over 30 percent for these adds. However, as can be seen, these estimates are subject to a large amount of sampling variability.

All the district offices in which the nonhousehold sources program was conducted were located in either a centralized or decentralized census area. As mentioned in earlier chapters, "centralized" and "decentralized" are descriptions of two operating procedures used in the 1980 census within the areas enumerated by the mail-out/ mail-back technique. A centralized procedure was followed in the central cities of large metropolitan areas,

and a decentralized procedure was used elsewhere. In the decentralized procedure, all the filled-in questionnaires which were mailed back were given to enumerators who, working from their homes, conducted many of the census operations, such as followup for questionnaires not returned by mail. The centralized procedure, used in the largest cities, was characterized by having as much of the operation as possible take place under close supervision in one office.

Tables 18, 19, and 20 show the 1980 census counts in the centralized and

decentralized census areas. The 1980 census population distribution is shown in this table by race and Spanish/Hispanic origin. For comparison, the distribution of the nonhousehold sources primary and secondary adds are also shown in this table. Blacks comprise 13 percent of the population in areas covered by the nonhousehold sources program. However, 31 percent (25,010 persons) of the primary and 31 percent (13,953 persons) of secondary adds were Black. In the centralized area, Blacks were added at essentially the same rate as the overall population percentage. In the decentralized area, Blacks comprise 9 percent of the population while 25 percent (6,939 persons) of the primary and 27 percent (5,687 persons) of the secondary adds were Black. It also appears that Spanish/Hispanic persons may have been added at a higher proportion than the general population. However, the extensive variability in the Spanish/Hispanic estimates makes this comparison very difficult.

It must be noted that the data in tables 18, 19, and 20 should not be interpreted to imply that coverage differences of the degree described in the previous paragraph exist for Black and Spanish/Hispanic persons, versus non-Black and non-Spanish/Hispanic persons for these areas. Rather, it should be treated as evidence that the pre-

Table 16. Estimated Sex and Spanish/Hispanic Origin of Nonhousehold Sources Primary Adds and Percent Distribution of Total Primary Adds

(Standard errors in parenthesis)

| Spanish/Hispanic origin | Sex | | Total |
|---|--------------------|-------------------|--------------------|
| | Males | Females | |
| Total.....Number... | 54 632 (12 565) | 26 888 (6 453) | 81 520 (18 750) |
| Percent.. | 67.0 (15.4) | 33.0 (7.9) | 100.0 - |
| Of Spanish/Hispanic origin.....Number... | 19 537 (10 159) | 8 077 (3 715) | 27 614 (14 635) |
| Percent.. | 24.0 (12.5) | 9.9 (4.6) | 33.9 (18.0) |
| Not of Spanish/Hispanic origin.....Number... | 27 972 (6 434) | 14 303 (3 433) | 42 275 (9 723) |
| Percent.. | 34.3 (7.9) | 17.5 (4.2) | 51.8 (11.9) |
| Spanish/Hispanic origin unknown.....Number... | 7 123 (1 638) | 4 508 (1 082) | 11 631 (2 675) |
| Percent.. | 8.7 (2.0) | 5.6 (1.3) | 14.3 (3.3) |

- Means not applicable.

Table 17. Estimated Sex and Spanish/Hispanic Origin of Nonhousehold Sources Secondary Adds and Percent Distribution of Total Secondary Adds

(Standard errors in parenthesis)

| Spanish/Hispanic origin | Sex | | Total |
|---|---------|---------|----------|
| | Male | Females | |
| Total.....Number... | 23 472 | 21 856 | 45 328 |
| | (5 399) | (5 245) | (10 425) |
| Percent.. | 51.8 | 48.2 | 100.0 |
| | (11.9) | (11.6) | |
| Of Spanish/Hispanic origin.....Number... | 8 090 | 8 715 | 16 805 |
| | (4 207) | (5 578) | (8 907) |
| Percent.. | 17.9 | 19.2 | 37.1 |
| | (9.3) | (12.3) | (19.7) |
| Not of Spanish/Hispanic origin.....Number... | 13 157 | 11 260 | 24 417 |
| | (3 026) | (2 702) | (5 616) |
| Percent.. | 29.0 | 24.8 | 53.8 |
| | (6.7) | (6.0) | (12.4) |
| Spanish/Hispanic origin unknown.....Number... | 2 225 | 1 881 | 4 106 |
| | (512) | (451) | (944) |
| Percent.. | 4.9 | 4.2 | 9.1 |
| | (1.1) | (1.0) | (2.1) |

- Means not applicable.

identification of minority tracts was successful.

Table 21 displays combined race and Spanish/Hispanic origin data for the primary and secondary adds. In this table, three demographic race/origin categories are given: Non-Spanish/Hispanic and Non-Black, Spanish/Hispanic-Non-Black, and Black (containing both Spanish/Hispanic and non-Spanish/Hispanic persons). It was estimated that about 62 percent of the primary and secondary adds were Black and/or Spanish/Hispanic persons.

Operational Characteristics of the Nonhousehold Sources Operation

In order to evaluate the substantial difference between the expected and actual

Table 18. Distribution of Census Population in Centralized and Decentralized Areas Covered by the Nonhousehold Sources Program and Estimated Distribution of Nonhousehold Sources Adds

(Standard errors in parenthesis)

| Type of census area | 1980 Census population figures | | Nonhousehold sources primary adds | | Nonhousehold sources secondary adds | |
|-------------------------------|--------------------------------|---------|-----------------------------------|---------|-------------------------------------|---------|
| | Number | Percent | Number | Percent | Number | Percent |
| Centralized and Decentralized | 172 450 049 | 100 | 81 520 | 100 | 45 328 | 100 |
| | | | (18 750) | - | (10 425) | - |
| White..... | 139 144 016 | 81 | 26 568 | 32 | 15 140 | 33 |
| | | | (6 376) | (7.7) | (3 634) | (7.9) |
| Black..... | 23 395 049 | 13 | 25 010 | 31 | 13 953 | 31 |
| | | | (4 752) | (5.9) | (2 651) | (5.9) |
| Other..... | 9 910 984 | 6 | 20 907 | 26 | 13 897 | 31 |
| | | | (11 081) | (13.8) | (7 365) | (16.4) |
| Race unknown..... | - | - | 9 035 | 11 | 2 338 | 5 |
| | | | (2 078) | (2.5) | (538) | (1.1) |
| Non-Spanish/Hispanic origin.. | 159 035 941 | 92 | 42 275 | 52 | 24 417 | 54 |
| | | | (9 723) | (12.0) | (5 616) | (12.4) |
| Spanish/Hispanic origin..... | 13 414 108 | 8 | 27 614 | 34 | 16 805 | 37 |
| | | | (14 635) | (18.0) | (8 907) | (19.6) |
| Origin unknown..... | - | - | 11 631 | 14 | 4 106 | 9 |
| | | | (2 675) | (3.2) | (944) | (2.1) |

- Means not applicable.

Table 19. Distribution of Census Population in Centralized Areas Covered by the Nonhousehold Sources Program and Estimated Distribution of Nonhousehold Sources Adds

(Standard errors in parenthesis)

| Type of census area | 1980 Census population figures | | Nonhousehold sources primary adds | | Nonhousehold sources secondary adds | |
|-------------------------------|--------------------------------|---------|-----------------------------------|---------|-------------------------------------|---------|
| | Number | Percent | Number | Percent | Number | Percent |
| Centralized..... | 27 014 398 | 100 | 53 571 | 100 | 24 440 | 100 |
| | | | (18 214) | - | (8 310) | - |
| White..... | 14 499 092 | 54 | 12 661 | 23 | 4 884 | 20 |
| | | | (4 685) | (8.5) | (1 807) | (7.4) |
| Black..... | 9 778 925 | 36 | 18 072 | 34 | 8 266 | 34 |
| | | | (4 337) | (8.2) | (1 984) | (8.2) |
| Other..... | 2 736 381 | 10 | 17 040 | 32 | 10 312 | 42 |
| | | | (11 417) | (21.4) | (6 909) | (28.1) |
| Race unknown..... | - | - | 5 798 | 11 | 978 | 4 |
| | | | (1 971) | (3.7) | (333) | (1.4) |
| Non-Spanish/Hispanic origin.. | 23 390 651 | 87 | 26 072 | 49 | 9 091 | 37 |
| | | | (8 864) | (16.7) | (3 091) | (12.6) |
| Spanish/Hispanic origin..... | 3 623 747 | 13 | 20 536 | 38 | 13 513 | 55 |
| | | | (13 759) | (25.5) | (9 054) | (36.8) |
| Origin unknown..... | - | - | 6 963 | 13 | 1 836 | 8 |
| | | | (2 367) | (4.4) | (624) | (2.7) |

- Means not applicable.

Table 20. Distribution of Census Population in Decentralized Areas Covered by the Nonhousehold Sources Program and Estimated Distribution of Nonhousehold Sources Adds

(Standard errors in parenthesis)

| Type of census area | 1980 Census population figures | | Nonhousehold sources primary adds | | Nonhousehold sources secondary adds | |
|-------------------------------|--------------------------------|---------|-----------------------------------|--------------|-------------------------------------|--------------|
| | Number | Percent | Number | Percent | Number | Percent |
| Decentralized..... | 145 435 651 | 100 | 27 949 (7 546) | 100 - | 20 888 (5 640) | 100 - |
| White..... | 124 644 924 | 86 | 13 907 (4 450) | 50 (16.0) | 10 256 (3 282) | 49 (15.7) |
| Black..... | 13 616 124 | 9 | 6 939 (1 665) | 25 (6.0) | 5 687 (1 365) | 27 (6.5) |
| Other..... | 7 174 603 | 5 | 3 866 (1 856) | 14 (6.7) | 3 585 (1 721) | 17 (8.2) |
| Race unknown..... | - | - | 3 237 (874) | 11 (3.0) | 1 360 (367) | 7 (2.0) |
| Non-Spanish/Hispanic origin.. | 135 645 290 | 93 | 16 203 (4 375) | 58 (15.7) | 15 326 (4 138) | 73 (19.7) |
| Spanish/Hispanic origin..... | 9 790 361 | 7 | 7 078 (3 397) | 25 (12.0) | 3 292 (1 580) | 16 (7.7) |
| Origin unknown..... | - | - | 4 668 (1 260) | 17 (4.6) | 2 270 (613) | 11 (3.0) |

- Means not applicable.

Table 21. Combined Race, Spanish/Hispanic Origin and Sex Estimated for Primary and Secondary Nonhousehold Sources Adds and Percent Distribution of Primary and Secondary Adds

(Standard errors in parenthesis)

| Type of add | Race and origin | | | | | | | Total |
|------------------------------|--|---------|---|---------|---------|---------|--|----------|
| | Non-Spanish/Hispanic origin or non-Black | | Spanish/Hispanic origin, non-Black race | | Black | | Race and Spanish/Hispanic origin unknown | |
| | Male | Female | Male | Female | Male | Female | | |
| Total.....Number... | 19 452 | 10 892 | 26 667 | 16 106 | 20 950 | 14 715 | 18 063 | 126 845 |
| | (2 174) | (2 941) | (13 867) | (7 409) | (3 562) | (3 532) | (4 154) | (29 174) |
| Percent.. | 15.3 | 8.6 | 21.0 | 12.7 | 16.5 | 11.6 | 14.2 | 100.0 |
| | (3.5) | (2.3) | (10.9) | (5.8) | (2.8) | (2.8) | (3.3) | - |
| Primary adds.....Number... | 11 937 | 6 117 | 19 019 | 7 531 | 15 310 | 8 170 | 13 436 | 81 520 |
| | (2 746) | (1 652) | (9 890) | (3 464) | (2 603) | (1 961) | (3 090) | (18 750) |
| Percent.. | 14.6 | 7.5 | 23.3 | 9.2 | 18.8 | 10.0 | 16.5 | 100.0 |
| | (3.4) | (2.0) | (12.1) | (4.2) | (3.2) | (2.4) | (3.8) | - |
| Secondary adds.....Number... | 7 515 | 4 775 | 7 648 | 8 575 | 5 640 | 6 545 | 4 627 | 45 325 |
| | (1 728) | (1 289) | (3 977) | (5 488) | (959) | (1 571) | (1 064) | (10 425) |
| Percent.. | 16.6 | 10.5 | 16.9 | 18.9 | 12.4 | 14.4 | 10.2 | 100.0 |
| | (3.8) | (2.8) | (8.8) | (12.1) | (2.1) | (3.5) | (2.3) | - |

- Means not applicable.

1980 Census nonhousehold sources yield rates, the characteristics of the operation were studied. As described in the introduction, there were three basic phases of processing the Nonhousehold Sources forms in the 1980 census district offices. First, the forms underwent an address and subsequent name matching procedure. Then the forms that were found to be candidates for missed persons were sent for a followup (either telephone or personal visit). Finally, an office operation was instituted to add those persons determined to have been missed by the followup to the census. These phases of the nonhousehold sources operation were evaluated as follows:

Address and Name Matching Operations—Tables 22 and 23 display the

results of the address and name matching operations, respectively. Each of these two operations can result in persons being dropped from future consideration in the nonhousehold sources operation. These matching operations are crucial. If a significant number of persons are erroneously dropped from further processing, the overall yield of the program is jeopardized. Table 22 shows the results of the address matching operation. A substantial portion of the addresses in the centralized area, 20 percent, were matched to an ineligible multiunit structure and were not processed any further. The cases that continued on to the name matching stage of processing were those classified as "Match/Possible Match to the master address registers," about 5.4 million names and addresses. It should be

noted that the 1980 census test experiences had indicated that the rate of matching to an ineligible multiunit structure would be between 3 and 4 percent.

Table 23 gives the results of the name matching phase of the nonhousehold sources program. It should be noted that approximately 60 percent of the nonhousehold sources cases were matched during the name matching operation. This figure was somewhat higher than that observed during the 1980 pretests which was about 45 percent. An explanation for this higher match rate may have been that the 1980 census coverage was better than in the pretests due to the extensive publicity campaign. Another important category in table 23 is "Non-Match to Census." Persons falling in this category were sent for a followup inter-

Table 22. Estimated Address Matching Results and Percent Distribution of Total List Size by Census Area

(Standard errors in parenthesis)

| Address match result | Census area | | Total area |
|--|------------------------|------------------------|--------------------------|
| | Centralized | Decentralized | |
| Total list size...Number... | 3 042 399 (638 904) | 3 755 028 (938 757) | 6 797 427 (1 155 563) |
| Percent.. | 100.0 - | 100.0 - | 100.0 - |
| Match/possible match.....Number... | 2 197 245 (461 421) | 3 217 143 (804 286) | 5 414 388 (920 446) |
| Percent.. | 72.2 (15.2) | 85.7 (21.4) | 79.7 (13.5) |
| Non-match.....Number... | 93 939 (19 727) | 120 300 (30 075) | 214 239 (36 421) |
| Percent.. | 3.1 (0.7) | 3.2 (0.8) | 3.1 (0.5) |
| Matched to a vacant/ delete unit.....Number... | 113 880 (23 915) | 147 700 (36 925) | 261 580 (44 469) |
| Percent.. | 3.8 (0.8) | 3.9 (1.0) | 3.8 (0.6) |
| Matched to an ineligible multi-unit structure.....Number... | 615 941 (129 348) | 244 879 (61 220) | 860 820 (146 339) |
| Percent.. | 20.2 (4.2) | 6.5 (1.6) | 12.7 (2.2) |
| Miscellaneous.....Number... | 21 394 (4 493) | 25 006 (6 252) | 46 400 (7 888) |
| Percent.. | 0.7 (0.1) | 0.7 (0.2) | 0.7 (0.1) |

- Means not applicable.

Table 23. Estimated Name Matching Results and Percent Distribution of Cases Eligible for Name Matching by Census Area

(Standard errors in parenthesis)

| Name match result | Census area | | Total area |
|--|------------------------|------------------------|------------------------|
| | Centralized | Decentralized | |
| Total list size for name matching.....Number... | 2 197 245 (461 421) | 3 217 143 (804 286) | 5 414 388 (920 446) |
| Percent.. | 100.0 - | 100.0 - | 100.0 - |
| Non-match to census.....Number... | 672 905 (141 310) | 1 150 875 (287 719) | 1 823 780 (310 043) |
| Percent.. | 30.6 (6.4) | 35.8 (8.9) | 33.7 (5.7) |
| Match/possible match to census.....Number... | 1 363 893 (286 418) | 1 926 266 (481 566) | 3 290 159 (559 327) |
| Percent.. | 62.1 (13.0) | 59.9 (15.0) | 60.8 (10.3) |
| Unable to locate questionnaire.....Number... | 151 664 (31 849) | 128 071 (32 018) | 279 735 (47 555) |
| Percent.. | 6.9 (1.4) | 4.0 (1.0) | 5.2 (0.9) |
| Questionnaire for a refusal household.....Number... | 8,783 (1 844) | 11 931 (2 983) | 20 714 (3 521) |
| Percent.. | 0.4 (0.1) | 0.4 (0.1) | 0.4 (0.1) |

- Means not applicable.

view because the nonhousehold sources person was not found on the census questionnaire which corresponded to his/her address. In the centralized area 22 percent of the total list was sent to followup and 31 percent in the decentralized area.

Followup Operations—As was seen in table 23, about 1,820,000 persons were assigned for a followup interview. Table 24 gives the resolution of the followup interviews for these persons. As can be seen, the rate at which persons were

made primary and secondary adds in centralized areas (8.0 and 3.6 percent) respectively, was higher than the corresponding rates in decentralized areas (2.4 and 1.8 percent) respectively. There was clearly a much higher payoff per case followed-up in centralized than in decentralized areas.

It should also be noted in table 24, that a large number of cases existed for which enumeration status could not be determined as a result of the followup. These cases could occur as a result of not being able to contact a household to conduct the nonhousehold source interview, or contacting a household and not being able to find a respondent who knew of the existence of the nonhousehold source person. No additional followup was conducted for these cases since previous studies had shown that this would not result in a substantial gain. The proportion of cases for which enumeration status could not be determined is consistent with the 1980 census test findings [2].

Operations to Add Persons to the Census—Table 24 also indicates that about 58,000 persons (49,000 primary and 9,000 secondary) should have been added to the 1980 census, but were not due to procedural errors. It is unknown specifically why these persons were not added, but some reasonable speculation can be made. The nonhousehold sources program was conducted late in the census processing during the time when there was great pressure to finish the work and close the district offices. The adding of persons to the census was done manually by clerks and it was a slow and cumbersome operation which may have become more error prone given the pressure to hurry. In addition, other major operations were going on simultaneously which made it difficult to locate census questionnaires and make the adds. Also, this phase of the program had never been pretested. Therefore, problems associated with adding persons had not been anticipated and, consequently, safe guards against missing adds had not been established. On the positive side, it should be noted that very few persons were added to the

Table 24. Estimated Resolution of All Followup Cases and Percent Distribution of Followup Work Load by Census Area

(Standard errors in parenthesis)

| Resolution | Census area | | Total area |
|--|----------------------|------------------------|------------------------|
| | Centralized | Decentralized | |
| Total followup cases.....Number... | 672 905 (141 310) | 1 150 875 (287 719) | 1 823 780 (310 043) |
| Percent.. | 100.0 - | 100.0 - | 100.0 - |
| Primary adds.....Number... | 53 571 (18 214) | 27 949 (7 546) | 81 520 (18 750) |
| Percent.. | 8.0 (2.7) | 2.4 (0.6) | 4.5 (1.0) |
| Secondary adds.....Number... | 24 440 (8 310) | 20 888 (5 640) | 45 328 (10 425) |
| Percent.. | 3.6 (1.2) | 1.8 (0.5) | 2.5 (0.6) |
| Should have been a primary add, but was not.....Number... | 35 010 (7 352) | 14 314 (3 578) | 49 324 (8 385) |
| Percent.. | 5.2 (1.1) | 1.2 (0.3) | 2.7 (0.5) |
| Should have been a secondary add, but was not.....Number... | 7 924 (1 664) | 855 (214) | 8 779 (1 492) |
| Percent.. | 1.2 (0.3) | 0.1 (0.02) | 0.5 (0.1) |
| Erroneously added.....Number... | 2 533 (532) | 1 271 (318) | 3 804 (647) |
| Percent.. | 0.4 (0.1) | 0.1 (0.02) | 0.2 (0.03) |
| Determined to have been previously enumerated....Number... | 19 998 (4 200) | 18 779 (4 695) | 38 770 (6 591) |
| Percent.. | 3.0 (0.6) | 1.6 (0.4) | 2.1 (0.4) |
| Enumeration status undetermined after followup.....Number... | 529 429 (111 180) | 1 066 819 (266 705) | 1 596 248 (271 362) |
| Percent.. | 78.7 (16.5) | 92.7 (23.2) | 87.5 (14.9) |

- Means not applicable.

census who should not have been added (0.2 percent).

It is evident that there were three problem areas in the 1980 census program that contributed to the low yield rate. First, the decentralized area payoff of adds per case followed-up was well below the centralized area. Second, in the centralized area a large proportion of addresses were dropped from processing because they were classified as ineligible multiunit structures. Third, only 70 percent of the persons who should have been added to the census actually were. If these conditions had not existed, or could have been eliminated, it can be estimated that the national rate of added persons could have been higher. For example, if the nonhousehold sources operation had been restricted to centralized areas, if the ineligible multiunit structures could have been screened out of the list prior to cen-

sus processing; and if all eligible persons could have been added to the census, then the operation could have had a national add rate of approximately 5 percent of the nonhousehold sources list size.

Nonhousehold Sources Adds by Type of List

It is also of interest to examine the results of the nonhousehold sources program by list type. As previously stated, the list of names and addresses used in the Nonhousehold Sources Program had been obtained from three sources; the Department of Motor Vehicles (DMV), the U.S. Immigration and Naturalization Service (INS) and the 1979 New York City Public Assistance file.

Table 25 gives the persons added per follow-up case, as primary adds by these

three list types. Clearly, the Public Assistance and INS lists offered as good a payoff as the DMV list.

Costs

The disparity in the total number of cases processed and the yield of added persons for the centralized and decentralized areas is reflected in the cost of the nonhousehold sources program. The district office and field work for the nonhousehold sources program is estimated to have cost approximately \$6.3 million, of which about \$2.8 and \$3.5 million was spent in centralized and decentralized areas, respectively. This amounts to about \$35.00 per person added in centralized areas and \$73.00 per person added in decentralized areas. Clearly the nonhousehold sources program was less expensive on cost per added case in centralized areas than in decentralized areas.

These represent 1980 census costs for the matching, followup, and processing in the district offices. An additional \$3.52 million was spent on precensus address coding and computer processing. Thus, the total cost for the nonhousehold sources program was about \$9.82 million.

CONCLUSIONS

The major goal of the NHHS Program was to increase the coverage of minority populations. The program succeeded in adding about 127,000 persons to the 1980 census and the largest group added were Black and Spanish/Hispanic persons.

The program was expensive and did not add persons at the anticipated rate. However, the program has potential if operational problems can be corrected. Had these problems been eliminated, the yield rate for 1980 would have been 5 percent, thereby making the program more cost effective. In addition, while the add rate was below expectations, the program was very successful in adding persons from minority populations. Finally, each of the three lists used in the program provided substantial adds for various minority populations.

Table 25. Estimated Number and Percent of Persons Added Per Followup Case by Type of List

(Standard errors in parenthesis)

| List type | Type of census | | Total area |
|----------------------------------|----------------------|------------------------|------------------------|
| | Centralized | Decentralized | |
| All lists: | | | |
| Number of adds..... | 53 571 (18 214) | 27 949 (7 546) | 81 520 (18 750) |
| Percent of followup workload.... | 8.0 (2.7) | 2.4 (0.6) | 4.5 (1.0) |
| Followup workload..... | 672 905 (141 310) | 1 150 875 (287 719) | 1 823 780 (310 043) |
| DMV: | | | |
| Number of adds..... | 34 815 (11 837) | 23 801 (6 426) | 58 616 (13 482) |
| Percent of followup workload.... | 6.5 (2.2) | 2.2 (0.6) | 3.7 (0.9) |
| Followup workload..... | 531 727 (111 663) | 1 063 293 (265 823) | 1 595 020 (271 153) |
| INS: | | | |
| Number of adds..... | 13 541 (4 604) | 3 141 (848) | 16 682 (3 837) |
| Percent of followup workload.... | 12.8 (4.4) | 4.7 (1.3) | 9.7 (2.2) |
| Followup workload..... | 105 750 (22 208) | 67 044 (16 761) | 172 794 (29 375) |
| Public assistance: | | | |
| Number of adds..... | 2 707 (920) | - | 2 707 (623) |
| Percent of followup workload.... | 14.9 (5.1) | - | 14.9 (3.4) |
| Followup workload..... | 18 150 (3 812) | - | 18 150 (3 086) |
| Unknown: | | | |
| Number of adds..... | 2 508 (853) | 1 007 (272) | 3 515 (808) |
| Percent of followup workload.... | 14.5 (4.9) | 4.9 (1.3) | 9.3 (2.1) |
| Followup workload..... | 17 278 (3 628) | 20 538 (5 134) | 37 816 (6 429) |

- Means not applicable.

These findings have suggested areas for improvement of the yield rate for the program. First, consideration is being given to limiting future use of the program to highly urban areas. The program was most efficient in producing census adds in centralized areas. In the decentralized area the yield rates were low for work done, consequently, the cost to add a person in the decentralized area was twice the cost to add a person in the centralized area.

Second, consideration is being given to

automating various phases of the program. Areas that could benefit from automation are the name and address matching phases of the project. An automated matching system will provide the means for checking all addresses quickly and efficiently. Addresses at ineligible multiunit structures could be eliminated early in the process. In this event a higher proportion of potentially productive cases could be sent to the field collection offices.

Another area in which automation could improve the program is in the phase in which persons were added to the census. An automated system would eliminate the need for physically searching for census questionnaires in order to add persons, thereby reducing the risk of missing added persons due to not being able to locate questionnaires. This system would also provide a means of keeping track of those cases sent to followup so that their resolution could be more accurately monitored. Overall, an automated system should speed the entire process and provide immediate feedback on the status of cases during all phases of the program.

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| FORM D-434 (3-14-79) D-CT | | O.M.B. No. 41-S79024; Approval Expires June 1981 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------------|---|--------------|---------|--|------|--|-----|-----|-----|---|--|--|---|--|--|---|--|--|---|--|--|---|--|--|---|--|
| U.S. DEPARTMENT OF COMMERCE BUREAU OF THE CENSUS NONHOUSEHOLD SOURCES RECORD 20th Decennial Census - 1980 | | NOTICE - Your report to the Census Bureau is confidential by law (title 13, U.S. Code). It may be seen only by sworn Census employees and may be used only for statistical purposes. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Section A - IDENTIFICATION | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Control No. | | 2. Name | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Address - Number, street, apartment designation | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Post office | | State | ZIP code | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Sex | 5. Date of birth | Month | Year | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Geographic codes | D.D. number | ED number | Block number | | | | | | | | | | | | | | | | | | | | | | | | |
| Section B - OFFICE MATCH RESULTS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B1. Match address in Section A, item 3 to MAR a. Address not in MAR No further action b. Address in MAR (1) Vacant or deleted No further action (2) Occupied - Enter serial number in B2 c. Multi-unit structure in MAR and no apartment designation in Section A, item 3 (1) + in column (6) of MAR No further action (2) 9 or less in column (6) of MAR - Match surname in Section A, item 2 to column (13) of MAR (a) Name does not match No further action (b) Name matches - Enter serial number in B2 | | B2. Find and search questionnaire with serial number _____ a. Missing No further action b. "Refusal" on front of questionnaire No further action c. Name in Section A, item 2 found on questionnaire No further action d. Name in Section A, item 2 not found on questionnaire - Enter names of persons on questionnaire in Section E, line numbers 1 through 10 and enter characteristics in Section E, item 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Section C - TELEPHONE FOLLOWUP INTERVIEW | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Followup clerk name | | 2. Telephone number | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Source <input type="checkbox"/> Questionnaire <input type="checkbox"/> Not available <input type="checkbox"/> Other _____ | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Record of calls | | 4a. Good (morning, afternoon, evening). I am (your name) from the U.S. Bureau of the Census. We are calling households in the area to make sure everyone was counted in the 1980 Census. Is this (read address from Section A)? <input type="checkbox"/> Yes - Continue with 4b <input type="checkbox"/> No - End interview and mark the "Unable to contact" box in item 3 <input type="checkbox"/> Refusal - Continue with 4b | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">Call</th> <th style="width: 15%;">Date</th> <th style="width: 80%;">Remarks</th> </tr> <tr> <th></th> <th>Time</th> <th></th> </tr> <tr> <th>(a)</th> <th>(b)</th> <th>(c)</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </tbody> </table> | | Call | Date | Remarks | | Time | | (a) | (b) | (c) | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | b. To whom am I speaking? <input type="checkbox"/> Same person as in Section A - Skip to 4d <input type="checkbox"/> Different person than in Section A Enter name _____ and continue with 4c <input type="checkbox"/> No name given - Continue with 4c c. Do you know (name of person in Section A)? <input type="checkbox"/> Yes - Continue with 4d <input type="checkbox"/> No - Skip to Section E, Check Item A d. Did (name of person in Section A/you) live here April 1, 1980? <input type="checkbox"/> Yes - Add name to Section E, item 2, complete Section E, items 3a-e and continue with Section E, Check Item A <input type="checkbox"/> No - Continue with Section E, Check Item A | |
| Call | Date | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Time | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (a) | (b) | (c) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Unable to contact - Assign to Followup 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Section D - PERSONAL VISIT INTERVIEW | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. I am (your name) from the U.S. Bureau of the Census; here is my identification. We are visiting addresses to check to see if everyone was counted in the 1980 Census. What is your name? <input type="checkbox"/> Same person as in Section A - Skip to 3 <input type="checkbox"/> Different person than in Section A Enter name _____ and continue with 2 No name given - Continue with 2 | | 2. Do you know (name of person in Section A)? <input type="checkbox"/> Yes - Continue with 3 <input type="checkbox"/> No - Skip to Section E, Check Item A 3. Did (name of person in Section A/you) live here on April 1, 1980? <input type="checkbox"/> Yes - Enter name in Section E, item 2, complete Section E, items 3a-e and continue with Section E, Check Item A <input type="checkbox"/> No - Continue with Section E, Check Item A | | | | | | | | | | | | | | | | | | | | | | | | | |

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| Section E — HOUSEHOLD ROSTER | | | | | | | | | | |
|---|--|---|--|--|--|--|-----------------------|--|--|--|
| CHECK ITEM A | Does the roster in item 1 below include the name of the person to whom you are speaking? <input type="checkbox"/> Yes — Continue with 1 <input type="checkbox"/> No or no name given — END INTERVIEW | | | | | | | | | |
| 1. These are the persons we have listed as living here on April 1, 1980. (Read list) Was anyone else living here on that date? a. <input type="checkbox"/> Yes — Enter names in 2 below and complete 3a–e for each person. b. <input type="checkbox"/> No — END INTERVIEW | | 3. ASK FOR ALL PERSONS ADDED <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; vertical-align: top;">a. What is ...'s relationship to (name of person on line 1 of item 1)?</td> <td style="width: 15%; vertical-align: top;">b. What is ...'s sex?</td> <td style="width: 20%; vertical-align: top;">c. Is ... 1 — White? 2 — Black or Negro? 3 — Japanese? 4 — Chinese? 5 — Filipino? 6 — Korean? 7 — Vietnamese? 8 — Indian (Amer.)? Specify tribe 9 — Asian Indian? 10 — Hawaiian? 11 — Guamanian? 12 — Samoan? 13 — Eskimo? 14 — Aleut? 15 — Other? — Specify</td> <td style="width: 15%; vertical-align: top;">d. What is ...'s date of birth? (mo./yr.)</td> <td style="width: 35%; vertical-align: top;">e. Is ... of Spanish/Hispanic origin or descent? 1 — No, not Spanish/Hispanic 2 — Yes, Mexican, Mexican-Amer., Chicano 3 — Yes, Puerto Rican 4 — Yes, Cuban 5 — Yes, other Spanish/Hispanic</td> </tr> </table> | | | | a. What is ...'s relationship to (name of person on line 1 of item 1)? | b. What is ...'s sex? | c. Is ... 1 — White? 2 — Black or Negro? 3 — Japanese? 4 — Chinese? 5 — Filipino? 6 — Korean? 7 — Vietnamese? 8 — Indian (Amer.)? Specify tribe 9 — Asian Indian? 10 — Hawaiian? 11 — Guamanian? 12 — Samoan? 13 — Eskimo? 14 — Aleut? 15 — Other? — Specify | d. What is ...'s date of birth? (mo./yr.) | e. Is ... of Spanish/Hispanic origin or descent? 1 — No, not Spanish/Hispanic 2 — Yes, Mexican, Mexican-Amer., Chicano 3 — Yes, Puerto Rican 4 — Yes, Cuban 5 — Yes, other Spanish/Hispanic |
| a. What is ...'s relationship to (name of person on line 1 of item 1)? | b. What is ...'s sex? | c. Is ... 1 — White? 2 — Black or Negro? 3 — Japanese? 4 — Chinese? 5 — Filipino? 6 — Korean? 7 — Vietnamese? 8 — Indian (Amer.)? Specify tribe 9 — Asian Indian? 10 — Hawaiian? 11 — Guamanian? 12 — Samoan? 13 — Eskimo? 14 — Aleut? 15 — Other? — Specify | d. What is ...'s date of birth? (mo./yr.) | e. Is ... of Spanish/Hispanic origin or descent? 1 — No, not Spanish/Hispanic 2 — Yes, Mexican, Mexican-Amer., Chicano 3 — Yes, Puerto Rican 4 — Yes, Cuban 5 — Yes, other Spanish/Hispanic | | | | | | |
| Line No. | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 2. Enter names below and complete 3a–e for each person. | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| Section F — CENSUS ADDITIONS | | | | | | | | | | |
| 1. Person in Section A added? Yes No | | | 2. Other persons added? Yes — Enter line numbers from Section E, item 2 Line numbers _____ No | | | | | | | |
| Remarks | | | | | | | | | | |

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Appendix 7. Sample Design, Estimation, and Evaluation Methodology

The evaluation of the nonhousehold sources program was based on reviewing a sample of materials that were saved from the 1980 Census. The sample design, estimation procedures, and evaluation methodology are described briefly, as follows:

SAMPLE DESIGN

The sample for the nonhousehold sources evaluation was basically a two-stage stratified sample. As for most of the evaluations, the first stage sampling unit was the 1980 census district office. For the second stage of selection, the nonhousehold source forms were sorted within the selected district offices into a number of analytical categories. A systematic sample was selected within each category.

For the first stage selection, the 409 census district offices were arranged into six strata, as described in the appendix for chapter 2. A simple random sample without replacement was selected from each

stratum, and this sample was supplemented several times. A complete description of the sampling appears in [3]. The strata and sample sizes were as follows:

Stratum V "Decentralized District Offices with Prelist Recanvass—Rural," did not contain any district offices in which the nonhousehold sources program was implemented. Thus, no district offices from this stratum were included in the sample.

For the second stage sampling, the nonhousehold sources forms were arranged into 12 categories within each selected district office. The forms were then further sorted by list type. The 12 categories corresponded to various phases of processing from the nonhousehold sources operation (e.g., added to census, matched by name to a census questionnaire, etc.). Within each category by list type grouping of forms, a systematic sample of forms was selected for further processing. The second stage sampling rates were usually 10 percent with several exceptions as noted in [3].

ESTIMATION

In order to produce estimates from the nonhousehold sources sample, each processed form was assigned a first stage weight, W(1) and a second stage weight, W(2). The second stage weights were simply the inverse of the second stage selection probability, and were usually equal to 10. The first stage weights were calculated based on a complex ratio adjustment that was made to the inverse of the first stage selection probabilities. Due to space limitations, this adjustment cannot be described in this document. A full explanation appears in [3]. Thus, for any characteristic total estimated from this evaluation, \hat{Y} , the estimate was obtained as

Y-hat = sum over h=1 to 5 of m_h * sum over i=1 to n_hi of w_hi^(1) * w_hij^(2) * y_hij

where,

m_h denotes the number of sample district offices in the hth stratum.

n_hi denotes the number of nonhousehold source forms selected at the second stage in the ith sample district office in the hth stratum.

w_hi^(1) denotes the first stage weight assigned to the ith sample district office in the hth stratum.

w_hij^(2) denotes the second stage weight assigned to the the jth sampled nonhousehold source form in the ith sample district office in the hth stratum.

y_hij denotes the characteristic total for the jth sampled nonhousehold source form in the ith sample district office in the hth stratum.

Table 26. Strata and Sample Sizes for First Stage Selection of District Offices—Nonhousehold Sources Evaluation

| Stratum number | Stratum description | Number of district offices in stratum | Number of district offices in sample |
|----------------|--|---------------------------------------|--------------------------------------|
| | Total..... | 409 | 59 |
| I | Centralized district offices in a city with 1,000,000 or more persons..... | 39 | 8 |
| II | Balance of centralized district offices..... | 48 | 9 |
| III | Decentralized district offices without prelist recanvass operation | 194 | 23 |
| IV | Decentralized district offices with Prelist Recanvass Operation - Urban..... | 67 | 11 |
| V | Decentralized district offices with Prelist Recanvass Operation--Rural..... | 25 | 0 |
| VI | Conventional plus two-procedure district offices..... | 36 | 8 |

Variance estimates for the estimated characteristic totals, $\hat{V}(\hat{Y})$, were calculated as

where,

$$\hat{V}(\hat{Y}) = \sum_{h=1}^5 \frac{m_h}{m_h - 1} \sum_{j=1}^{m_h} \left(\hat{y}_{hi} - \frac{\sum_{h=1}^{m_h} \hat{y}_{hi}}{m_h} \right)^2$$

where,

$$\hat{y}_{hi} = \sum_{j=1}^{n_{hi}} w_{hi}^{(1)} w_{hij}^{(2)} y_{hij}$$

EVALUATION METHODOLOGY

As with most of the other evaluations described in this document, the nonhousehold sources evaluation consisted of examining a sample of materials used in the 1980 census operations. For this evaluation, the nonhousehold sources operation was simulated, and the results of the simulation were tabulated. In particular, a person was determined to have been added to the census only if two conditions existed: (1) the nonhousehold sources form on which the person was listed con-

tained information that the nonhousehold source followup had determined that the person had not been previously enumerated; and (2) the person was found on a 1980 census questionnaire. It should also be noted that no additional efforts were made to reinterview the nonhousehold sources cases. Thus, many of the reasons for which the nonhousehold sources followup remained inconclusive are based strictly on remarks and indications recorded on the nonhousehold sources followup form.

Chapter 8. Followup of Vacant and Deleted Housing Units

INTRODUCTION AND BACKGROUND

As part of the 1980 census, all housing units classified by census enumerators as vacant or nonexistent were revisited to determine if they had been correctly classified. The initial classification of housing units as vacant or deleted varied depending upon the type of census procedure under which the housing unit was enumerated. As has been discussed in earlier chapters, under the mail census procedures most persons were enumerated by being mailed a questionnaire, filling out the questionnaire and then mailing it back. For households for which no questionnaire was mailed back, enumerators were sent to determine if the households were occupied and if so, to enumerate them. As a result of this followup for nonresponse, housing units that had not mailed back a questionnaire were classified as occupied, vacant, or nonexistent. Under the conventional door-to-door list-and-enumerate census procedures, enumerators classified housing units as occupied or vacant as they visited them. Under either census procedure housing units that were initially classified as vacant or nonexistent were revisited to determine if they had been correctly classified.

The problem of incorrect classification was investigated as part of the 1970 Census in the National Vacancy Check [1]. This was a large post census survey in which a sample of housing units classified by enumerators as vacant were revisited to determine whether they had been misclassified. The National Vacancy Check results indicated that 11.4 percent of the vacant housing units in the 1970 Census were misclassified. As a result of

these findings, over one million persons or about 0.5 percent of the total population was added to the 1970 census counts. These persons were added as the result of an imputation procedure which was based on the misclassification rates observed in the National Vacancy Check.

As part of the 1970 census evaluation program, the Mail Area Housing Coverage Study was also conducted [2]. This study was based on relisting a sample of city blocks and matching the revisited housing units to the census address records. In mail census areas in 1970, this study detected a 16.5 percent rate of misclassification of vacant housing units. Additionally, in this study the errors which resulted in misclassification of occupancy status were identified to be of two primary types enumerator and procedural. Enumerator errors were those errors where enumerators visited a housing unit which had been occupied before and during census, and classified it as vacant. Procedural errors were errors of misclassification because of units which had been vacant early in the census taking period, but which were occupied before the end of the census as the result of someone moving in. In addition, in order to be a procedural error, the persons who moved in would not have been enumerated at their previous address.

For the 1980 census, the Bureau adopted a position of eliminating, as much as possible, imputation procedures such as those used in the 1970 Vacancy Recheck. Therefore, in preparing for the 1980 census, the Census Bureau studied improvement of coverage by reinterviewing all housing units classified by mail nonresponse followup or by conventional census enumerators as either vacant or nonexistent [3]. As part of these studies, it was found that a check of vacant and

nonexistent housing units could provide a substantial coverage improvement yield, particularly for those housing units found to be misclassified due to enumerator error. For units misclassified due to procedural error, it was found that a possibility existed for over-counting movers. In order to correctly count movers, the Census Bureau tested a number of movers checks. However, these operations proved to be operationally infeasible. In addition, studies of movers indicated that the census would miss a substantial number of these persons if no action was taken. Thus for 1980, the followup of vacant and nonexistent units was expanded to correcting misclassification of units due to both procedural and enumerator errors. Moreover, at each housing unit determined to have been misclassified, the current occupants were asked if they had moved since census day; and, if so, if they had been previously enumerated. Those movers who responded that they had been previously enumerated were not enumerated by the followup of vacant and deleted housing units. The purpose of this later check was to minimize over counting of movers. All others were enumerated at the current address.

Additional testing in preparation for the 1980 Census indicated that very poor results would be obtained from a followup of those housing units which were classified as vacant-usual-home-elsewhere or as transfers [3]. Vacant-usual-home-elsewhere housing units were housing units that were occupied at census time by persons who claimed to have a usual residence at a different location. Transfers were housing units that were deleted from the census files by early census procedures due to situations which required a geographic transfer of a housing unit from one location to another. These units

were determined to be out-of-scope for the followup of vacant or nonexistent units.

In summary, the 1980 census followup of vacant and nonexistent units was directed at correcting for both enumerator and procedural misclassifications. The followup was to be performed for all units classified as vacant or non-existent by the mail nonresponse followup or by conventional census enumerators with the exception of units determined to be vacant-usual-home-elsewhere, deletes due to geographic transfer procedures, or duplicate listings.

RESULTS

The results presented in this section are estimates based on a review of materials saved from a sample of census district offices. A description of the sample design and estimation procedures is given in the appendix to this chapter.

Overall Impact of Vacant/Delete Followup on 1980 Census Coverage

A total of 8.4 million vacant and nonexistent units were included in the 1980 census followup of vacant and deleted units. Table 27 gives a summary of the results of this followup. The vacant/delete followup procedure was conducted by examining the census master address registers at the conclusion of the non-response followup or at the conclusion of conventional enumeration. A form was prepared for each unit designated as vacant or nonexistent. (See facsimile D, shown at the end of this chapter.)

As may be seen in table 27, approximately 10 percent of the 5.8 million vacant housing units followed-up were converted to occupied. This closely parallels the 11 percent proportion of misclassified vacants detected by the 1970 Census National Vacancy Check [1]. The followup of nonexistent housing units resulted in the addition of about 408,000 housing units to the 1980 census—177,000 occupied and 231,000 vacant. The 408,000

Table 27. Results of Followup for Housing Units Designated as Vacant or Deleted

(Standard errors in parenthesis)

| Type of housing unit and vacant delete followup result | Number | Percent |
|--|------------------------|---------------|
| Total housing units in followup..... | 8 441 783 (420 000) | - - |
| Total deleted units in followup..... | 2 346 916 (120 000) | 100.0 - |
| Remained deleted..... | 1 939 913 (97 000) | 82.6 (4.1) |
| Converted to occupied | 176 843 (20 000) | 7.5 (0.8) |
| Converted to vacant.. | 230 880 (28 000) | 9.8 (1.2) |
| Total vacant units in followup..... | 5 822 694 (290 000) | 100.0 - |
| Remained vacant..... | 5 231 838 (260 000) | 89.9 (4.5) |
| Converted to occupied | 590 856 (68 000) | 10.1 (1.2) |
| Housing units on forms not processed..... | 272 173 (41 000) | - - |

- Means not applicable.

added housing units represent about 0.5 percent of the 88 million housing units counted in the 1980 census. Finally, the 272,000 "Housing Units on Forms not Processed" resulted from some type of error in the 1980 census office or field procedures which erroneously did not process forms prepared for a vacant or deleted housing unit.

Table 27 presents the overall impact of the followup of vacant and nonexistent units on the 1980 census counts. As part of the evaluation of this operation, it was possible to estimate that some of the vacant and nonexistent housing units which retained their original classification should have been either converted to occupied or added. Additionally, some of the additions and conversions were done erroneously. Table 28 displays these data for vacant units and table 29 for nonexistent units.

The first aspect of tables 28 and 29 that must be noted is in regard to the "Processed Correctly" categories. This classification was based solely upon an examination of the Vacant/Delete Followup forms. No reinterview of these housing units was attempted. Thus, these numbers could include some residual errors that this study did not measure.

Table 28 indicates that approximately 11.2 percent of the 5.8 million vacant

Table 28. 1980 Census Processing Results for Followup of Vacant Housing Units

(Standard errors in parenthesis)

| | Number | Percent |
|---|------------------------|---------------|
| Total vacant housing units in followup.... | 5 822 694 | 100.0 |
| Total units which remained vacant..... | 5 231 838 (260 000) | - - |
| Processed correctly.. | 5 063 219 (250 000) | 87.0 (4.4) |
| Should have been converted to occupied..... | 168 619 (25 000) | 2.9 (0.4) |
| Total housing units converted to occupied.. | 590 856 (68 000) | - - |
| Processed correctly.. | 485 354 (56 000) | 8.3 (1.0) |
| Should have remained vacant... | 105 502 (16 000) | 1.8 (0.3) |

- Means not applicable.

Table 29. 1980 Census Processing Results for Followup of Deleted Listings

(Standard errors in parenthesis)

| | Number | Percent |
|---|------------------------|---------------|
| Total deleted listings in followup..... | 2 346 916 (120 000) | 100.0 - |
| Total listings that remained deleted..... | 1 939 193 (97 000) | - - |
| Correctly processed.. | 1 705 332 (85 000) | 72.7 (3.6) |
| Should have been converted to occupied..... | 106 128 (14 000) | 4.5 (0.6) |
| Should have been converted to vacant.. | 127 733 (17 000) | 5.4 (0.7) |
| Total units converted to occupied..... | 176 843 (20 000) | - - |
| Correctly processed.. | 150 234 (17 000) | 6.4 (0.7) |
| Should have been converted to vacant.. | 26 609 (3 500) | 1.1 (0.1) |
| Total units converted to vacant..... | 230 880 (28 000) | - - |
| Correctly processed.. | 215 930 (26 000) | 9.2 (1.1) |
| Should have been converted to occupied..... | 14 950 (1 900) | 0.6 (0.1) |

- Means not applicable.

housing units followed-up were found to be misclassified. However, due to errors in processing, only about 10.1 percent were converted and added to the census counts. As mentioned above, the 11.2 percent figure closely parallels the findings from the 1970 Census National Vacancy Check [1] which detected a misclassification rate of 11.4 percent.

Table 29 shows that, while 17.3 percent of the nonexistent housing units followed-up were converted from nonexistent status to occupied or vacant, an additional 9.9 percent were not converted but should have been. This 9.9 percent rate of processing error is substantially higher than the 2.9 percent rate for the followup of vacant housing units. Some speculation can be made that the 9.9 percent incorrectly processed rate for units which remained nonexistent is an overstatement of the actual error rate due to the materials on which this evaluation was based. The census master address registers occasionally lacked proper indications that addresses had been marked nonexistent due to a geographic transfer. The housing units which remained nonexistent, but which were classified as incorrectly processed by this evaluation could have included some vacant/delete followup forms which were erroneously prepared for 1980 Census transfers. Conceivably, these forms were not subsequently converted to either occupied or vacant status as a result of census field personnel detecting this error in time to prevent an erroneous enumeration. The 9.9 percent incorrectly processed estimate was developed based on observed responses on the Vacant/Delete Followup forms. In correcting any erroneous followup form preparation errors, it is likely that census field personnel did not update the followup forms, but only excluded them from the 1980 census correction operations.

Errors Which Resulted in Misclassification of Vacant Housing Units

As discussed above, the 1970 Census Mail Area Study [2] distinguished two basic types of errors which could result in the misclassification of occupancy status enumerator and procedural. Table 28 indicates that about 654,000 of the 5.8 million vacant housing units followed-up were misclassified as vacant. A breakdown of these units by procedural and enumerator error is given in table 30.

Table 30. Misclassified Vacant Housing Units by Type of Error—Enumerator or Procedural

(Standard errors in parenthesis)

| Type of error | Number | Percent of vacant housing units in followup |
|---|------------------------|---|
| Total misclassified vacant housing units..... | 653 973 (98 000) | 11.2 (1.7) |
| Enumerator error.. | 527 377 (79 000) | 9.1 (1.4) |
| Procedural error.. | 126 596 (19 000) | 2.2 (0.3) |
| Total vacant housing units in followup.. | 5 822 694 (290 000) | - - |

- Means not applicable.

Demographic Characteristics of Persons Enumerated in Converted Vacant and Nonexistent Housing Units.

It was possible to estimate demographic characteristics for persons in about 692,000 of the housing units which were enumerated in the 1980 census as occupied from the followup of vacant and deleted housing units. These data are shown in table 31 as follows:

As may be seen in table 31, there is some evidence that the proportion of Blacks among the persons added from the followup of vacant and nonexistent housing units was somewhat higher than in the general population. It appears that the followup of vacant and nonexistent units may have been beneficial in decreasing

ing differential census coverage of Black persons.

Cost of the Followup of Vacant and Nonexistent Housing Units

This operation was one of the most expensive of the 1980 census coverage improvement operations, costing about \$36,320,000. This amounted to a cost of \$36.40 per housing unit either added to the census from the followup of nonexistent housing units or converted from vacant to occupied status by the followup of vacant housing units.

CONCLUSIONS

The followup of vacant and nonexistent housing units either added or converted from vacant to occupied, a substantial number of housing units. There was also some evidence that the persons enumerated in these units contained a higher proportion of Black persons than found in the general population. The cost of this operation was, however, the largest of all the coverage improvement programs. It is also doubtful that the cost of the procedure could be reduced substantially, by the use of automated record keeping, since most of the costs were incurred from field work. Automation can provide a means of accurate record keeping, and also help to increase the proportion of units correctly included in the followup.

Table 31. Demographic Characteristics of Persons Added to the Census From the Vacant/Delete

(Standard errors in parenthesis)

| Race and Hispanic origin | Persons added from vacant/delete followup | | Persons in total population | |
|---------------------------|---|--------------|-----------------------------|---------|
| | Number | Percent | Number | Percent |
| Total persons..... | 1 724 087 (190 000) | 100 - | 226 545 875 | 100 |
| White..... | 1 258 617 (130 000) | 73 (7.7) | 188 371 689 | 83 |
| Black..... | 325 549 (65 000) | 19 (3.8) | 26 495 028 | 12 |
| Other..... | 139 922 (41 000) | 8 (2.3) | 11 679 158 | 5 |
| Non-Spanish/Hispanic..... | 1 544 424 (170 000) | 90 (10.0) | 211 937 204 | 94 |
| Spanish/Hispanic..... | 179 664 (48 000) | 10 (2.7) | 14 608 671 | 6 |

- Means not applicable.

The results from the 1980 Census evaluations indicate that if the effects of the followup of vacant and nonexistent housing units are not considered then the misclassification rates for vacant units closely parallels those observed for the 1970 Census. Clearly, in both 1970 and 1980 there was a coverage problem for housing units initially classified as vacant by the census. In 1970, an imputation procedure was used to correct for these errors, and in 1980 a field followup procedure was applied. In preparing for the 1990 census, procedures are being studied to eliminate the initial misclassifi-

cation of vacant and nonexistent housing units⁶ (e.g., stronger quality control of enumerator work). If these procedures are not successful, then either followup or imputation procedures for vacant and nonexistent units will be necessary again, to avoid a serious underenumeration error.

REFERENCES

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- [2] U.S. Bureau of the Census, Census of Population and Housing: 1970, Evaluation and Research Program, PHC(E)-5, *The Coverage of Housing in the 1970 Census*, 1973.
- [3] Griffin, Richard A. and Lavelley, Richard W., *Census Coverage Loss Due to the Misclassification of Occupied Units*, Paper presented at the 1978 Annual Meeting of the American Statistical Association, San Diego, August 1978.

FACSIMILE D. UNIT STATUS REVIEW, FORM D-160

Form Approved: O.M.B. No. 41-S79022

| | | | | | | | | | |
|---|--------------------------|---|--|--|----------|-----------------|---|--|---|
| FORM D-160 (4-2-79) C.D.-CT | | U.S. DEPARTMENT OF COMMERCE BUREAU OF THE CENSUS | | NOTICE - Your answers are confidential. The law (title 13, United States code) requires that you answer the questions to the best of your knowledge. | | | | | |
| UNIT STATUS REVIEW 20th Decennial Census - 1980 | | | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%; text-align: center;">OFFICE USE ONLY</td> <td style="width: 20%; text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">3</td> </tr> </table> | | OFFICE USE ONLY | 2 | | 3 |
| OFFICE USE ONLY | 2 | | | | | | | | |
| | 3 | | | | | | | | |
| Section A - IDENTIFICATION | | | | | | | | | |
| 1. D.O. number | | 2. ED number | | 3. Block number | | | | | |
| | | | | 4. Serial number | | | | | |
| | | | | 5. Type of form <input type="checkbox"/> S <input type="checkbox"/> L | | | | | |
| 6. Address | House number | Street, rural route and box No., or lockbox No. | | | Unit | | | | |
| | Post office name or city | | | State | ZIP code | | | | |
| 7. Location description | | | | | | | | | |
| Section B - PRESENT STATUS OF UNIT | | | | | | | | | |
| <input type="checkbox"/> 1. Occupied - Conduct the interview in section C. <input type="checkbox"/> 2. Vacant - Speak to a knowledgeable person to verify that the unit is vacant. Complete section D. <input type="checkbox"/> 3. Nonexistent - Speak to a knowledgeable person to verify that the unit does not exist. Complete section D. | | | | | | | | | |
| Section C - UNIT NOW OCCUPIED | | | | | | | | | |
| READ: I am (your name) from the U.S. Bureau of the Census; here is my identification. We are checking addresses in the area to make sure everyone was counted in the 1980 Census. | | | | | | | | | |
| 1. When did this family move to this address? _____ → | | | | | Date | | | | |
| 2. ENUMERATOR CHECK ITEM <input type="checkbox"/> On or before April 1, 1980 - Fill the appropriate census questionnaire. Complete section D. <input type="checkbox"/> After April 1, 1980 - Continue with question 3. | | | | | | | | | |
| 3. Was a 1980 census questionnaire completed for this family? <input type="checkbox"/> Yes - Complete section D. <input type="checkbox"/> No - Fill the appropriate census questionnaire. Complete section D. | | | | | | | | | |
| Section D - ENUMERATOR CONTROL | | | | | | | | | |
| NOTE: If you filled a census questionnaire, enclose this form inside the questionnaire after completing this section. | | | | | | | | | |
| 1. Enumerator name | | | | 2. C.L. District number | | | | | |
| 3. Date of interview | | 4. Time of interview a.m. _____ p.m. _____ | | 5. Status <input type="checkbox"/> Complete <input type="checkbox"/> Incomplete - Explain to crew leader | | | | | |
| 6. Person providing information | | | | | | | | | |
| a. Name _____ | | | | c. <input type="checkbox"/> Occupant <input type="checkbox"/> Neighbor <input type="checkbox"/> Owner/manager <input type="checkbox"/> Custodian <input type="checkbox"/> Other - Specify _____ | | | | | |
| b. Telephone number _____ | | | | | | | | | |

Appendix 8. Sample Design, Estimation, and Evaluation Methodology

The sample design for this evaluation was similar to that of most of the evaluations discussed in this report. Essentially it was based on a first stage sample of census district offices, and a second stage sample of materials within the district offices. The design, estimation, and the methodology used for this evaluation are discussed briefly as follows:

SAMPLE DESIGN

The sample was basically a two-stage cluster sample. The first stage sampling unit was the 1980 census district office, and the second stage sampling unit was the vacant/delete followup form within district office. The 409 district offices were arranged to six strata as discussed in the appendix to chapter 2. The six strata and resulting sample sizes were as follows for the first stage selection:

Within each stratum, a simple random sample of District Offices was selected without replacement. Within each selected district office, the forms used for

this study were arranged into 27 strata, based on various characteristics that had resulted from their 1980 census processing. A 10 percent sample of forms was selected systematically from each of the 27 strata.

ESTIMATION

An estimate for any of the characteristic totals presented in this report, \hat{Y} , was obtained as follows:

$$\hat{Y} = \sum_{h=1}^6 \sum_{j=1}^{n_h} \frac{N_h}{n_h} 10 y_{hj},$$

where,

y_{hj} Denotes the raw total of forms with the characteristic in the j^{th} sample district office in the h^{th} stratum.

N_h Denotes the total number of district offices in the h^{th} stratum.

n_h Denotes the number of sampled district offices in the h^{th} strata.

Estimates of variance of the estimated characteristic total \hat{Y} , $\hat{V}(\hat{Y})$, were obtained as

$$\hat{V}(\hat{Y}) = \frac{\sum_{h=1}^6 \sum_{j=1}^{n_h} n_h \left[\hat{y}_{hj} - \sum_{j=1}^{n_h} \frac{\hat{y}_{hj}}{n_h} \right]^2}{n_h - 1}$$

where,

$$\hat{y}_{hj} = \frac{N_h}{n_h} 10 y_{hj}$$

EVALUATION METHODOLOGY

As has been described previously, this evaluation was based on reviewing a sample of 1980 Census forms and other materials used in the followup of vacant and nonexistent units. The procedures used in this review are briefly described as follows:

1980 Census Vacant/Delete Followup Procedures

In order to discuss the evaluation methodology, additional details of the 1980 census Vacant/Delete Followup operations are necessary. At the conclusion of the followup for mail nonresponse or conventional listing and enumeration census clerks reviewed the census master address registers. For those addresses indicated to be either vacant or nonexistent, with the exceptions noted above, the form shown in facsimile D was prepared. This form included the address, and census geographic codes associated with the vacant or nonexistent housing units. The form also included an indication in the "Office Use Only" box as to whether the address was vacant or nonexistent. This was the initial pre-followup classification

Table 32. Stratification of District Offices for the Vacant/Delete Followup Evaluation

| Stratum number | Stratum description | Number of district offices in stratum | Number of district offices in sample |
|----------------|---|---------------------------------------|--------------------------------------|
| | Total..... | 409 | 44 |
| I | Centralized district offices in a city with 1,000,000 or more persons..... | 39 | 5 |
| II | Balance of centralized district offices..... | 48 | 5 |
| III | Decentralized district offices without Prelist Recanvass Operation..... | 194 | 13 |
| IV | Decentralized district offices with Prelist Recanvass Operation--Urban..... | 67 | 7 |
| V | Decentralized district offices with Prelist Recanvass Operation--Rural..... | 25 | 7 |
| VI | Conventional and two-procedure offices..... | 36 | 7 |

of the housing unit. These forms were given to census enumerators who in turn completed the remaining sections (B, C, and D). These forms were saved for this evaluation in the sample of district offices.

Review of Vacant/Delete Followup Forms

In order to produce the data in this report, the sample of forms for each sample district office was clerically reviewed. Forms were first classified as either having been completed by enumerators as occupied, vacant, or nonexistent. Those classified as nonexistent received no further processing. Forms classified as vacant, by both the initial census classification and by the census followup enumerators, also received no further processing. Thus, no reinterview was attempted to determine if these forms were correctly processed in the 1980 census.

Those forms which were classified by the followup enumerators as occupied or classified by the followup enumerators as vacant, with an initial classification of nonexistent, were processed through an additional clerical review. These forms were matched to the census master address registers to determine if any updates had been made during the census field processing. Section C was also reviewed for those forms classified as occupied. Forms which indicated that they had been occupied before census day were determined to be misclassified due to enumerator error. The remaining forms fell into the procedural error classification. Forms which had been initially classified as vacant, had an indication that they had been occupied *after* census day, and had an answer to question C3 (Had you been counted before?) as "yes" were considered as candidates for erroneous enumeration.

The final enumeration status of the

forms classified as occupied was based on a match to the Census Bureau internal 1980 census data files. Those forms which matched to an occupied household were determined to have been enumerated as occupied. Data from the census files for these forms served as the basis for the demographic tabulations given in the section on "Demographic Characteristics of Persons Enumerated in Converted Vacant and Nonexistent Housing Units." Those forms which did not match to the census data files and had been initially marked as nonexistent were considered to not have been included in the census. Those forms, which did not match to the census data file, and had been initially marked as vacant were considered to have remained vacant in the 1980 census. Thus, it was assumed for both these classes of forms that not enough evidence was available to indicate that their original census classification had been changed.

Chapter 9. The Prelist Recanvass Operation

INTRODUCTION AND BACKGROUND

As described in earlier chapters, the 1980 census was conducted primarily as a mail-out/mail-back/followup procedure. The 1980 census address list was prepared in two basic ways. In areas where a commercial vendor list was available, the Census Bureau computerized geographic coding program existed, and city mail delivery was performed, the address list was prepared by purchasing the commercial lists, and updating the lists with three Post Office checks and an enumerator dependent canvass (Precanvass). In the remaining mail census area, the 1980 census address lists were prepared by enumerator canvass approximately a year in advance of the census. These addresses were then updated by two Post Office checks. These areas are referred to as Prelist areas. The Prelist Recanvass operation was conducted in portions of the Prelist area where it was thought housing coverage may have been deficient. The procedure involved recanvassing particular areas to add missed housing units and to delete duplicate listings.

The Prelist Recanvass procedure was developed during the course of taking the 1980 census in response to concern over the completeness of the address lists in prelist areas. In areas where the commercial list had been used as a base, the lists had undergone a process of four reviews. The first of these was conducted by the U.S. Postal Service with an advance check in May and June of 1979. An additional check was provided by the prec canvass coverage improvement operation in mid-February, and two more Postal Service reviews were made in early March and late March, just before Census Day,

at the time of delivery of the questionnaires. In contrast, the advance post office check had been cancelled in prelist areas, and no prec canvass had been conducted there. Earlier 1980 census pretest studies had shown that the Post Office could miss new construction in rural areas [1] and [2]. Also, the two postal reviews that were conducted in early and late March were considered a potential source of duplicate enumerations arising from incorrectly geocoded postal adds.

The Prelist Recanvass operation was conducted well after Census Day during the later phases of field followup. The objectives of this operation were to add and enumerate housing units that had been missed in previous census operations, to delete listed units that were located outside the boundaries of the recanvassed assignment areas, to reinstate deleted listings where appropriate, and to eliminate duplicate listings. Prelist Recanvass was conducted in a total of 137 district offices. Selection of district offices for recanvass was made according to criteria established by Census Bureau staff involved in directing the 1980 census. Some offices were selected by virtue of their location in the more rural parts of the prelist area where past experience had shown coverage problems to be relatively severe. Other district offices in prelist areas which had not initially been chosen for recanvass were recanvassed as time permitted. Additionally, in some district offices scheduled for the recanvass, only selected areas within the district offices were recanvassed.

RESULTS

The data presented in this section are estimates based on a sample. The appen-

dix to this chapter describes the sample design estimation, and evaluation methodology.

For the area covered by this evaluation, it was estimated that about 105,000 housing units were added or about 0.8 percent of the census count of housing units for this area. An estimated 217,000 persons were also enumerated in the housing units added by this evaluation. The standard errors of these two estimated totals are 36,000 and 62,000, respectively. It was also possible to obtain demographic characteristics of the persons added. A distribution of these data is shown in table 33. A corresponding distribution for persons in the general population counted by the census is also shown.

Clearly, in view of the estimated sampling errors, there is little difference between these two distributions.

The cost of this operation has been estimated at about \$10,290,000 for adding 105,000 housing units or approximately \$98 per unit. It is possible that the low add rate reflects that the prelist area in which this evaluation was conducted had a low housing unit undercoverage

Table 33. Distribution of Persons Added From the Prelist Recanvass
(Standard errors in parenthesis)

| Race | Distribution of persons in total population (Percent) | Estimated distribution of persons added from Prelist Recanvass (Percent) |
|-------------------|---|--|
| Total.. | 100 | 100 |
| White..... | 83 | 79 (22) |
| Black..... | 16 | 19 (6) |
| Other..... | 1 | 2 (1) |
| Spanish/Hispanic. | 1 | 1 (1) |

- Means not applicable.

rate. However, it is probable that the low add rate was the result of the way in which the Prelist Recanvass was implemented. The Prelist Recanvass operation was not planned or designed until late May of 1980. The procedures did not undergo the usual testing and review that was conducted for other census operations. Furthermore, the Prelist Recanvass procedures contained no provision for quality control. Clearly, under these circumstances, it is likely that operational problems occurred.

CONCLUSIONS

The Prelist Recanvass operation added a small proportion of housing units that otherwise would have been missed by the

census. The evaluation findings show that an estimated 105,000 housing units were added by the operation in the prelist area.

The Prelist Recanvass was implemented during the final stage of the 1980 census in response to anticipated difficulties in prelist areas. The procedures were written at the last minute, were quite complicated, and in most instances arrived late in the census district offices. Additionally, the operation did not undergo any quality control. These factors undoubtedly contributed to the poor pay-off that was observed in this evaluation. In planning for 1990, the Census Bureau is testing dependent canvass procedures in prelist areas. However, the procedures currently being tested are being conducted in advance of the census and have quality

control methodologies built into them. These new dependent canvass procedures are expected to exhibit better coverage improvement than the 1980 procedures.

REFERENCES

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- [2] Dinwiddie, James, Unpublished Internal Census Bureau Memorandum, *Comparisons of Coverage and Post Office Updating Effectiveness for Early vs. Late Prelisting in Rural Areas*, June 9, 1983.

Appendix 9. Sample Design, Estimation, and Evaluation Methodology

The evaluation of the prelist recanvass operation was based on a clerical review of materials saved from a sample of 1980 census district offices.

SAMPLE DESIGN

The universe of district offices for this evaluation consisted of 92 of the 137 district offices in which the prelist recanvass was applied. These 92 district offices were divided into two strata depending on whether or not they could be classified as urban or rural. The strata correspond to Strata IV and V described in the appendix to chapter 2. The strata and sample sizes are as follows:

Within each of the two strata, a simple random sample without replacement of district offices was selected. A 15-percent simple random sample without replacement of enumeration districts was selected within each district office. An enumeration district is a small area which does not cross any geographic boundaries recognized by the Census Bureau. Enumeration districts typically contain between 300 and 600 housing units.

ESTIMATION

For any characteristic of interest, an estimate of total, \hat{Y} , was produced as follows:

$$\hat{Y} = \sum_{h=1}^2 \left[\frac{N_h}{n_h} \left[\sum_{j=1}^{n_h} \frac{1}{0.15} y_{hj} \right] \frac{N_h}{\sum_{j=1}^{n_h} \frac{N_h}{n_h} M_{hj}} M_{hj} \right]$$

where,

N_h denotes the total number of district offices in the h^{th} stratum.

n_h denotes the total number of sample district offices in the h^{th} stratum.

y_{hj} denotes the unweighted characteristic total in the j^{th} district office in the h^{th} stratum.

M_{hj} denotes the total number of housing units in the j^{th} district office in the h^{th} stratum, in the Prelist Recanvass Operation.

It should be noted that a ratio estimate was used since materials were not saved or available for 4 of the district offices sampled in stratum IV and for one of the district offices in stratum V.

The estimated variance of \hat{Y} , $\hat{V}(\hat{Y})$ was obtained as follows:

$$\hat{V}(\hat{Y}) = \sum_{h=1}^2 \sum_{j=1}^{n_h} n_h \left(\hat{y}_{hj} - \frac{n_h}{\sum_{j=1}^{n_h} \frac{N_h}{n_h} M_{hj}} \hat{y}_{nj} \right)^2$$

where,

$$\hat{y}_{hj} = \left(\frac{N_h}{n_h} \right) \left(\frac{y_{hj}}{0.15} \right) \left(\frac{\sum_{j=1}^{n_h} M_{hj}}{\sum_{j=1}^{n_h} \frac{N_h}{n_h} M_{hj}} \right)$$

EVALUATION METHODOLOGY

The evaluation of the prelist recanvass operation was conducted in two phases. In the first phase the sample of address registers that the field enumerators had used for the recanvass were compared with the 1980 census master address registers. This procedure was applied to determine the number of housing units added to the census by the prelist recanvass procedure. In the second stage the census master address registers were examined to determine how many units had been reinstated or deleted by the prelist recanvass operation. These results were summarized for this analysis.

Table 34. Stratification of District Offices for the Prelist Recanvass Evaluation

| Stratum number | Stratum description | Number of district offices in stratum | Number of district offices in sample |
|----------------|---|---------------------------------------|--------------------------------------|
| | Total..... | 92 | 16 |
| IV | District offices with Prelist Recanvass--Urban..... | 67 | 8 |
| V | District offices with Prelist Recanvass--Rural..... | 25 | 8 |

Chapter 10. The Local Review Program

INTRODUCTION AND BACKGROUND

Decennial Census data are used for a variety of purposes which impact on local governments. For example, States use census counts for redistricting, and, in addition, a number of federal revenue allocation programs use population as a component of the formula that determines specific shares of monies earmarked for communities. Census counts or population estimates are used to set program eligibility for such programs as General Revenue Sharing, Community Development, and Urban Development Action Grants. Thus, local officials of functioning governments were concerned about the accuracy of the census count. The Local Review Program was designed to evaluate and improve the accuracy of the census data through review by local government officials. The method involved inviting local officials to participate in identifying and resolving errors in census counts early enough so that corrections could be made before the counts were finalized.

The Local Review Program for the 1980 census started in mid-February 1979 when the Bureau mailed the highest elected officials of about 39,000 general purpose functioning local governments, a booklet explaining in general terms the purpose and structure of the program. At the same time the Bureau asked the official to appoint a liaison to handle future contacts with the Bureau on local review. In October 1979 and in April or May of 1980, technical guides were sent to all the officials and to any liaisons who had been designated. These booklets contained specific guidelines on how the program would operate.

When the local governments received the booklets in April or May 1980 they also received detailed census maps showing boundaries for tracts, blocks, and enumeration districts (ED's). Enumeration districts were small geographic areas which did not cross any boundaries recognized by the Census Bureau. ED's were designed to consist, on an average, of about 300 to 600 housing units. Using the guidelines, maps, equivalency listings, and their own record systems, the local officials were to begin aggregating estimates of housing units to the ED level for comparison with the counts that the Bureau would send them. The census counts for local review were compiled manually in the district offices on an ED-by-ED basis at the close of the first followup for nonresponse. The counts were keyed by the regional offices into the Bureau's main computer system, where edits were performed. Beginning in early June the counts were sent to the local officials. Total housing unit and vacancy counts, and total population and group quarters population counts, were shown at the ED level, as well as several other columns of data—1970 total population and housing counts, the percent change in population and housing from 1970 to 1980, and population per household for 1970 and 1980. The local officials were asked to respond within 10 working days noting any discrepancies. Responses had to be based on "hard evidence" of a possible discrepancy and were only to consider missed housing units and group quarters population—not total population, vacancy rates, or population per household. The responses were to provide alternative counts at the ED level.

"Hard evidence," as explained in the technical guide, consisted of data from

special censuses conducted by the Bureau, the State, or the locality; lists of institutions and associated populations; local estimates of housing units derived from building and demolition permits, utility connections, land-use maps, aerial photography, tax assessment files, field counts of housing units or other housing unit inventories; or residential address lists. These local data could not be dated earlier than 1978 and had to be accompanied by a description of their source.

Census district office staff reviewed local official responses to determine what actions to take for areas that were cited with "hard evidence." In areas for which "hard evidence" of discrepancies was not provided or where the data were for larger geographic areas than those specified, reviews were undertaken only to the extent that time and budget permitted. The 10-day response time was not strictly adhered to by local officials. However, this did not exclude their responses from consideration; many district offices honored local responses until they closed. In taking action on the local official responses, an attempt was made first to resolve problems in the district office. One way of doing this was to verify whether the counts had been altered as a result of census operations, including coverage improvement checks, conducted by the district offices during or subsequent to local review. Even in cases where the counts still differed, some problems could be resolved by using address registers, questionnaires, maps, etc. Discrepancies in group quarters counts in particular could often be resolved in the office.

Problems which could not be resolved in the census district offices were assigned to enumerators for recanvassing. Enumerators conducted a dependent

re canvass of the areas they were assigned. For this operation enumerators updated the 1980 census Master Address Registers in a similar procedure to the prelist re canvass operation described in chapter 9. (It should be noted that no local review re canvass was attempted in areas which underwent the prelist re canvass procedures.) The results of this re canvass were recorded on special forms.

RESULTS

The data presented in this section are based on an evaluation of 1980 census records that were saved from the local review operation. These data are not subject to sampling error, but do contain some components of nonsampling error. The appendix to this chapter discusses the methodology used to produce these data and the potential sources of error.

Of the 39,000 jurisdictions on the Local Review Mailing List, about 12,000 (32%) contacted census officials as part of Local Review. Table 35 gives a summary of these responses.

Table 35 shows that about 6,600 jurisdictions reported problems, and that 5,800 expressed either satisfaction with this census count or no interest in participating in the program. It should be noted that many of the 26,000 governments that did not respond may have had no problems, or may have been part of a larger government which was responding for them. Of the 6,600 governments that responded with problems, more responded without acceptable evidence of problems than responded with "hard evidence." Local review records show, however, that these responses were processed in some instances.

The review of the local review materials

Table 36. Results of Local Review Re canvass Operations for Housing Unit and Person Counts

| Effect on housing unit and person counts | Type of re canvass action | | |
|--|---------------------------------|----------------------------------|----------------------------|
| | Deleted from 1980 census counts | Transferred to correct geography | Added to the census counts |
| Housing unit counts..... | 20 334 | 28 125 | 53 222 |
| Person counts..... | - | 56 328 | 75 741 |

- Means not available.

Table 35. 1980 Census Responses From Local Governments

| Type of response | Number of governments | Percent of governments |
|---|-----------------------|------------------------|
| Total..... | 38 785 | 100 |
| No Response..... | 26 393 | 68.0 |
| Total responses..... | 12 392 | 31.9 |
| No problems/satisfaction..... | 5 829 | 15.0 |
| Problems..... | 6 563 | 16.9 |
| Acceptable evidence of problem provided..... | 2 543 | 6.6 |
| Boundary discrepancies..... | 797 | 2.1 |
| Housing discrepancies..... | 597 | 1.5 |
| Group Quarter discrepancies..... | 213 | 0.5 |
| Combination of discrepancies..... | 381 | 0.1 |
| Miscellaneous discrepancies..... | 555 | 1.4 |
| Acceptable evidence of problem not provided.. | 4 020 | 10.4 |

indicate that problems were identified by local governments' in about 28,000 census ED's. Problems were resolved for about 20,000 ED s during the district office review without a re canvass. It was impossible for this evaluation to reconstruct the impact that this office review had on census counts. Additionally, the local review records indicate that many of the large urban areas maintained extensive communications with the Census Bureau. These communications certainly had a beneficial effect on census data, but this impact could not be reconstructed. It was possible, however', to reconstruct the results of the field re canvass of about 8,000 ED s. The effect of this re canvass is shown in table 36.

The local review program cost approximately \$4,310,000. About \$950,000 of this money was spent on actual field re canvass operations. The largest part of this money, about \$2,700,000, was

spent on generating the preliminary population and housing counts for local officials to review. The remaining \$660,000 was spent on census district office processing.

CONCLUSIONS

The objectives of the Local Review Program were to invite participation of local officials in reviewing and improving the accuracy of census counts. In areas where local officials participated, improvements were observed. The total effect of these improvements could not be measured by this evaluation, since only re canvass data were available. In planning for 1990, the Census Bureau is evaluating means of establishing stronger lines of communication with local officials, and in eliminating problem areas such as those described above.

Appendix 10. Evaluation and Methodology

The evaluation of the Local Review program was conducted by summarizing materials and records that had been saved from the 1980 census. Unlike many of the other evaluations, the Local Review evaluation was not based on a sample of district offices, but rather a review of all records saved from the program. The primary source of data for the evaluation were summary records that had been prepared during the census by the Field Division of the Census Bureau. These are the basis for the numbers which appear in this report. Incomplete records or erroneously recorded records could certainly contribute to nonsampling error sources in these data. No measures of this error are available. The figures given in the section, "Results," should not, however, be regarded as exact.

The evaluation of the record sources did

indicate several problems that occurred during the local review operations in the 1980 census. These are as follows:

1. The census counts which were sent to local offices were in some instances "very preliminary" and did not reflect additional counts that subsequent census operations added. This caused a great deal of concern to local officials.
2. Local officials were given ED counts instead of block counts. This caused local officials problems since they were more familiar with blocks.
3. Local officials either did not or could not adhere to the 10 working day notification of discrepancies response time. This caused delays in Census Bureau processing of local review responses.
4. Some local officials indicated that they did not have the resources or time to supply "hard evidence" to support their questions.
5. The local review technical guides apparently were not entirely helpful to local offices. Local officials did not always understand or apply census definitions when reviewing counts.
6. Local officials had problems with the census definition of vacant housing units. Many local officials restricted their attention to vacant housing units which were vacant for rent or for sale, and which had been available for an extended period of time. Local offices tended to exclude seasonal vacants, vacant units which had been rented or sold, but were not occupied on census day, and units which were sold off the market.

Chapter 11. "Were You Counted?" Campaign

INTRODUCTION AND BACKGROUND

The "Were You Counted?" campaign was a publicity program aimed at identifying and enumerating persons who were not included in the 1980 census through self-identification. The program was instituted at the conclusion of the mail nonresponse followup in mail census areas or at the conclusion of conventional enumeration in non-mail areas. The Census Bureau attempted to run advertisements in both the newspaper and electronic media to encourage persons who thought that they had not been counted in the 1980 census to respond to the Census Bureau so that they could be counted. This program resulted in the enumeration of about 71,000 persons in the 1980 census. This operation was also used during the 1970 census as the "Supplemental Forms Operation" [1]. In 1970 the "Supplemental Forms Operation" resulted in the enumeration of about 122,000 persons.

As mentioned above, the 1980 census "Were You Counted?" campaign was instituted after the conclusion of the mail nonresponse followup or conventional enumeration. At this time, local newspapers were sent a press release, cover letter, and a glossy copy of the "Were You Counted?" form (facsimile E, shown at the end of this chapter). These forms were printed in the newspapers at the option of the publishers, without remuneration, solely as a public service. A local electronic media campaign was instituted to advise people who thought that they may not have been counted in the 1980 census to obtain a "Were You Counted?" form from the local newspaper. Persons who thought that they had been missed were instructed to

complete the "Were You Counted?" form and return it to the census district office listed on the top of the form.

In the 1980 Census district offices, the forms were matched against census records to make sure that individuals who thought that they had been missed really were. This matching operation involved assigning census geographic codes to the respondents addresses and then searching the census records to see if any questionnaires existed for the respondents addresses. Questionnaires that were found during this search were matched against the "Were You Counted?" forms. Persons not found to be previously enumerated in the census were added to the counts.

RESULTS

These data are based on an evaluation of a sample of materials saved from the 1980 Census. The appendix to this chapter gives a description of the sample design, estimation, and evaluation methodologies that were used to produce the following estimates. In the following discussion estimated standard errors are shown in parentheses.

The "Were You Counted?" evaluation estimated that a total of about 62,000 (11,000) forms were received by the 1980 Census district offices. These forms contained about 140,000 (21,000) persons who thought that they had not been counted. Of these persons, about 71,000 (12,000) were added to the census and about 32,000 (12,000) were found to have already been enumerated, and the remaining 37,000 (12,000) persons were not added to the census for undetermined reasons. Finally, it was also found that approximately 4,400 (1,100) of the per-

sons added were duplicates of persons already in the census counts.

The "Were You Counted?" campaign cost about \$270,000 for the census district office processing of the "Were You Counted?" materials. Thus it cost about \$3.80 per person added from the campaign.

It should be noted that there is some evidence based on observations of the 1980 census that certain areas chose not to publish the "Were You Counted?" forms. The extent to which this occurred could not be measured by this evaluation.

CONCLUSIONS

The "Were You Counted?" campaign did not have a major impact on the 1970 or 1980 census counts as measured by number of direct adds to the census. However, the effect of the publicity that the 1980 census received due to the campaign is hard to evaluate. The "Were You Counted?" campaign was cost effective as compared to many of the other coverage improvement programs.

In planning for the 1980 census it is recognized that publicity is an important component of the census-taking process. Thus, programs such as "Were You Counted?" that publicize the census are receiving consideration for the 1990 census.

REFERENCES

- [1] U.S. Bureau of the Census, *Census of Population and Housing: 1970, Evaluation and Research Program PHC(E)-6, Effect of Special Procedures to Improve Coverage in the 1970 Census*, 1974.

FACSIMILE E. WERE YOU COUNTED?, FORM D-25



WERE YOU COUNTED?

The 1980 Census of Population and Housing is now almost finished. It is very important that the census be complete and correct. If you believe that you (or anyone else in your household, including visitors) were NOT counted, please fill out the form below and mail it IMMEDIATELY to: U.S. Census Office

PLEASE PRINT OR WRITE CLEARLY

- I have checked with the members of my household, and I believe that one (or more) of us was NOT counted in the 1980 Census.

- On April 1, 1980, I lived at

(House number)

(Street, road, etc.)

(Apartment number or location)

(City)

(County)

(State)

(ZIP code)

- This address is located between

(Street, road, etc.)

and

(Street, road, etc.)

- I am listing below the name and required information for myself and each member of my household.

INSTRUCTIONS FOR WHOM TO INCLUDE IN YOUR HOUSEHOLD: APRIL 1, 1980

PLEASE INCLUDE

All family members and other relatives living here, including babies.
All lodgers, boarders, and other persons living here.
All persons who usually live here but are temporarily away.
All persons with a home elsewhere but who stay here most of the week while working or attending college.
Anyone staying or visiting here who had no other home.

DO NOT INCLUDE

Any college student who stays somewhere else while attending college.
Any person away from here in the Armed Forces or in an institution such as a home for the aged or mental hospital.
Any person who usually stays somewhere else most of the week while working there.
Any person visiting here who has a usual home elsewhere.

NAMES OF ALL PERSONS LIVING IN THIS HOUSEHOLD
ON APRIL 1, 1980
AND THOSE STAYING OR VISITING HERE
WHO HAD NO OTHER HOME

Please list on Line ① a household member who owns
or rents the home.

How is this
person related
to the person
on line 1?

For example:
Husband /wife
Son /daughter
Father /mother
Grandson
Mother-in-law
Roomer,
boarder
Partner,
roommate

Male
or
Female
M or F

Is this person —

White Asian Indian
Black (Negro) Hawaiian
Japanese Guamanian
Chinese Samoan
Filipino Eskimo
Korean Aleut
Vietnamese Other —
Indian (Amer.) Specify
Print tribe

When was
this person
born?

Month Year

Is this person —

Now married
Widowed
Divorced
Separated
Single
(never married)

Is this person of Spanish/Hispanic origin or descent?

No — Not Spanish/
Hispanic
Yes —
Mexican
Mexican-American
Chicano
Puerto Rican
Cuban
Other Spanish/
Hispanic

Last name

First name

Middle initial

| | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
| ① | | | | | | | | | |
| ② | | | | | | | | | |
| ③ | | | | | | | | | |
| ④ | | | | | | | | | |
| ⑤ | | | | | | | | | |
| ⑥ | | | | | | | | | |

(If there are more than 6 persons, use an additional sheet)

- Name of person who filled this form

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
FORM D-25

Form Approved:
O.M.B. No. 41-S78006

NOTICE — This census is authorized by title 13, United States Code, and you are required by law to answer the questions to the best of your knowledge. The same law protects the confidentiality of your answers. Census employees are subject to fine and or imprisonment for any disclosure of your answers. Only after 72 years does your information become available to other government agencies or the public.

Cut along dotted line

Appendix 11. Sample Design, Estimation, and Evaluation Methodology

As discussed earlier, this evaluation was based on a review of a sample of the materials used for the "Were You Counted?" campaign during the 1980 census.

SAMPLE DESIGN

The sample on which the "Were You Counted?" evaluation was based, consisted of all the "Were You Counted?" forms that had been returned to a sample of 1980 census district offices. The 409 district offices were organized into six strata as described in the appendix to chapter 2. From each strata a simple random sample of district offices was selected. The strata sizes and associated sample sizes are as follows:

Each selected district office was directed to save all of the "Were You Counted?" materials for evaluation. Thus, there was no second stage sampling for the "Were You Counted?" evaluation.

ESTIMATION

The first portion of the evaluation involved reviewing the materials that had been obtained from the sampled district offices. During this operation it became apparent that the "Were You Counted?" forms were not available for 19 of the 50 sample district offices. It could not be determined if this was the result of losing the forms at the conclusion of the 1980 census or if the district offices had never received any "Were You Counted?" forms from respondents. For the purposes of this evaluation, it was assumed that the forms had been lost in closing the 1980 census, and the data were adjusted accordingly. This assumption could have resulted in an overestimate of the impact of the "Were You Counted?" campaign. The number of sample district offices for which data was available are shown as follows:

As can be seen table 38, strata I, II, and VI could be seriously impacted by missing

Table 38. Sample District Offices With "Were You Counted?" Forms

| Stratum number | Number of sample district offices in strata for which data were available | Number of district offices in sample |
|----------------|---|--------------------------------------|
| Total | 31 | 50 |
| I | 3 | 5 |
| II | 1 | 5 |
| III | 14 | 15 |
| IV | 6 | 8 |
| V | 6 | 8 |
| VI | 1 | 9 |

data. For this reason, the data were not tabulated by centralized and decentralized areas. Furthermore, it was assumed that estimates from strata VI were only applicable for the mail census area, since no observations were available for the conventional area. Thus, only the mail census district offices were used in the estimation process so that the estimates given in the section, "Results," are only applicable to the mail census area. Estimates were derived for any characteristic total, \hat{Y} , as follows:

$$\hat{Y} = \sum_{h=1}^6 \sum_{j=1}^{n_h} \frac{N_h}{n_h} y_{hj}$$

where,

N_h denotes the total number of 1980 census district offices in the h^{th} stratum.

n_h denotes the number of sample district offices in the h^{th} stratum for which data was available.

y_{hj} denotes the characteristic total observed for the j^{th} sample district office, with observed data, in the h^{th} stratum.

Table 37. Stratification for the "Were You Counted?" Evaluation

| Stratum number | Stratum description | Stratum sizes | Number of district offices in sample |
|----------------|---|---------------|--------------------------------------|
| | Total..... | 409 | 50 |
| I | Centralized district offices in a city with 1,000,000 or more persons..... | 39 | 5 |
| II | Balance of centralized district offices..... | 48 | 5 |
| III | Decentralized district offices without Prelist Recanvass Operation..... | 194 | 15 |
| IV | Decentralized district offices with Prelist Recanvass Operation--Urban..... | 67 | 8 |
| V | Decentralized district offices with Prelist Recanvass Operation--Rural..... | 25 | 8 |
| VI | Conventional and two-procedure offices..... | 36 | 9 |

Estimated standard errors were produced from a collapsed stratum technique. It should be noted that the estimated standard errors may not contain components of nonsampling bias due to the assumptions concerning the extreme amount of missing data. Care should be exercised in the interpretation of the data given in the section, "Results."

EVALUATION METHODOLOGY

For the district offices for which the 1980

census "Were You Counted?" forms were available, the 1980 census procedures were simulated. Each "Were You Counted?" form was geocoded to 1980 census geography.

The 1980 census records in this geography were searched for the addresses and persons listed on the "Were You Counted?" forms. Many of the "Were You Counted?" forms also contained indications of the geography to which they had been coded in the 1980 census. The census records in areas that corresponded to geographic codes that

differed were also searched. This resulted in the identification of the duplicate enumerations. When a person was found in the 1980 census records they were considered to have been added from the "Were You Counted?" campaign if suitable documentation that the "Were You Counted?" campaign had resulted in their enumeration was also recorded in the census records. The results of the clerical search of census materials for the persons on the "Were You Counted?" forms were then tabulated for the estimation described above.

Chapter 12. Assistance Centers

In order to aid respondents in completing questionnaires, and in directing persons who had not been enumerated how to be counted, the Census Bureau established assistance centers. Assistance centers were formed in the 1980 census District Offices. The assistance centers were staffed by specially trained persons to provide answers to questions concerning the census and the questionnaire, and also to arrange for enumerator visits to households when this was required to enumerate individuals. In the highly urban portions of the country, two types of assistance was available, telephone and walk-in. In the remainder of the country, telephone assistance was available.

The 1980 census questionnaire contained the telephone numbers of each assistance center for the local area to

which it was mailed. In addition, the existence, location, and method of contacting the assistance center was made known through the media and local public organizations.

The assistance centers were staffed by specially trained clerical personnel whose tasks included providing answers to questions from the public, arranging for enumerator visits when necessary, and recording assistance requests. Persons who indicated that they had not been counted were scheduled for an enumerator visit. If enumerators determined that a person had not been counted, a questionnaire was completed and returned to the census district office. A matching operation took place at the office to see if a questionnaire already existed for the persons reported to have

been missed. Those persons not found by this search were added to the census.

Unfortunately, the data necessary to study the impact of assistance centers on coverage improvement were not retained for analysis. No studies could be made in this regard.

However, assistance centers handled over 2,200,000 documented telephone questions concerning various aspects of the 1980 census questionnaire. The cost of operating the 1980 census assistance centers was about \$2,030,000 or a cost of less than \$0.92 per telephone call.

As mentioned in the previous chapters, promoting the census is considered to be a very important objective for the 1990 census. Certainly, assistance centers contribute to the overall public relations of the census.

Chapter 13. Spanish Questionnaires

INTRODUCTION AND BACKGROUND

The Spanish questionnaire was developed as a means of assisting persons whose primary language was Spanish with completing the 1980 Census questionnaire. It was expected that by simplifying self-enumeration for the Spanish-language speaking public, enumeration of the Spanish/Hispanic population would be improved for 1980. A translated version of the standard census questionnaire was available in Spanish for both the short form and the long form. In 1970, the Census Bureau had attempted to address problems connected with enumerating this group by mailing instructions in Spanish along with the English questionnaire to residents of areas with a concentration of persons of Hispanic origin. Additionally, questionnaires in Spanish were posted at assistance centers and local locations as examples of how the form should be completed.

The availability of a Spanish questionnaire option in 1980 was communicated to the public primarily via the standard census questionnaire. In mail-out/ mail-back census areas, respondents could request a questionnaire in Spanish in one of three ways. The first was by checking a box on the cover of the English language version (indicated by an instruction in Spanish) and mailing it back. The second was by calling the assistance center number which appeared on the front of the census form, and the third was by requesting one from the nonresponse followup enumerator if they had not returned a questionnaire to their district office. In conventional non-mail areas it was possible to obtain the appropriate questionnaire (or an interview in Spanish)

when the enumerator called at the household.

EVALUATION OF SPANISH QUESTIONNAIRE REQUESTS

As described above, there were three basic ways in which a Spanish questionnaire could have been requested during the 1980 census:

1. Marking the front of the census questionnaire;
2. Calling census assistance centers; or
3. Requesting a Spanish questionnaire from a nonresponse followup enumerator.

Each of these methods of requesting a Spanish questionnaire underwent an evaluation. The results of this evaluation are as follows:

Spanish Questionnaires Requested by Marking the Census Questionnaire

As a brief background, for the 1980 census in mail-out/mail-back areas instructions on the front page of the questionnaire directed respondents to check a box requesting a Spanish version of the questionnaire they had received. As the mail returns were checked in at the district offices, questionnaires with the Spanish questionnaire request marked were placed in a special plastic bag labeled "Spanish Questionnaire Requested." The census office clerks were then to enter "Spanish Questionnaire Requested" in the census Master Address Register and then send out a Spanish questionnaire in the mail. For late mail returns, the process was

slightly different. Instead of sending out a questionnaire, a form was prepared and given to the nonresponse enumerator so that a Spanish questionnaire could be prepared at the household.

For the evaluation of these kinds of Spanish questionnaire requests, it was found that the forms given to enumerators were not retained from the census, and apparently the census Master Address Registers had not been properly marked to indicate Spanish questionnaire requests. This evaluation thus concentrated on examining several other sources of mail return questionnaires from the 1980 census for requests of Spanish questionnaires: questionnaires from the Census Logistical Early Warning Sample and the Alternative Questionnaire study; questionnaires from the Update List Leave experiment, and questionnaires from the components of Variance Studies. A brief description of the studies and the findings from this analysis are as follows:

Census Logistical Early Warning Sample and Alternative Questionnaire Study— These studies were based on reviewing two national samples of mail return questionnaires, [1] and [2]. For these studies, Spanish questionnaire requests were classified as out-of-scope. A review of 1,313 out-of-scope questionnaires indicated that only six requests for a Spanish questionnaire were received.

Update List Leave Experiment— This was an experimental study of a list leave approach to census taking which was carried out in five census district offices [3]. These offices were selected to include areas with a high percentage of Spanish/Hispanic population in order to test the effect of personal contact in the enumeration of Spanish-speaking

households. As part of the list leave procedure, census enumerators were given an address list for an area and instructed to canvass the area and leave a questionnaire at every housing unit. Enumerators were also responsible for providing a Spanish questionnaire, if requested. When this happened, the English language version was marked "Spanish Questionnaire Requested" and saved. It should be noted that this occurred only when an enumerator contacted a well-informed person and this person requested a Spanish questionnaire. Results from the five district offices indicate that in three offices no requests were received. In the remaining two offices, 0.28 and 1.3 percent, respectively, of the questionnaires delivered, were delivered to households where a Spanish questionnaire was requested. It should be noted that subsequent post census studies indicated that some district offices in the Update List Leave Experiment did not contain a high proportion of Spanish persons.

Components of Variance Study—This study was directed at measurement of the edit and telephone followup components of census error. The study was based on an interpenetration of edit and followup questionnaire assignments [4]. From the sample questionnaires in one North Manhattan district office, it was possible to determine that for 22,681 long forms returned by mail or enumerator to the Manhattan district office, 62 (0.27 percent) were for Spanish questionnaires.

While the analysis described above is limited due to small sample size, possible lack of materials, or a lack of generality (case studies) it does present evidence that few respondents requested a Spanish questionnaire by marking the front of the 1980 census Questionnaire.

Spanish Questionnaires Requested Through Assistance Centers

Respondents living in centralized or decentralized district offices could request a

Spanish questionnaire through the assistance center number given on the cover of the standard questionnaire. Those telephone requests channeled through the assistance center should have been recorded before being sent to a transcription clerk who would have processed them in the same manner as for mail requests. The requests for a Spanish questionnaire was one of five types of referrals documented in the 1980 census assistance center records. The possible types of referrals were as follows: (1) requested appointment with enumerator; (2) Spanish questionnaire requested; (3) residents say they did not receive a questionnaire; (4) residents say they received questionnaire for the wrong address; and (5) residents say they lost the questionnaire.

As for many of the evaluations described in this document, a sample of district offices was selected for evaluation, and the materials from these offices were saved for post census analysis. The sample for this evaluation was the same as that used for the study of the Followup of Vacant and Deleted Housing Units, Chapter 8. From these materials, it was possible to tabulate about 18,900 assistance center requests. Of these, about 19 percent were Spanish questionnaire requests. Thus, there is evidence that Spanish questionnaires were requested with some frequency through the assistance centers.

Spanish Questionnaires Requested From Nonresponse Followup Enumerators

A potential source of Spanish questionnaire requests could have been requests made of the nonresponse enumerator when a visit to a Spanish speaking household occurred. However, in this situation, the enumerator either conducted the interview in Spanish, utilized someone in the household who also spoke English, or pointed simultaneously to questions on both a Spanish and standard

questionnaire and recorded the results directly on the standard questionnaire. No records were kept of the number of these interviews.

Costs

The only cost associated with the use of Spanish questionnaires which has been derived is the \$400,000 it cost to print the Spanish forms and associated materials.

SUMMARY

Based on this analysis, there is evidence that Spanish questionnaires were not widely requested on mail return questionnaires. However, there is also evidence that Spanish questionnaires were requested through the telephone assistance centers. While the impact of Spanish questionnaires on coverage cannot be fully evaluated, current planning for the 1990 census includes the study of the feasibility of the use of Spanish questionnaires.

REFERENCES

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- [2] Mockovac, William, *Preliminary Evaluation Results Memorandum No. 16, Analysis of Mail Return Rates for Alternative Questionnaire Experiment*, Internal Census Bureau Memorandum.
- [3] Brown, Cyndi; Mikkelsen, Gordon; and Lord, Sandra, *Overview of the Update List Leave Procedures*, Internal Census Bureau Memorandum.
- [4] United States Census Bureau, Form D-887, *Components of Variance Study Project Control Manual*, 1980.

Chapter 14. The Post Enumeration Post Office Check

INTRODUCTION AND BACKGROUND

As has been described in the earlier chapters approximately 95 percent of the 1980 census population was enumerated by the mail-out/mail-back/followup census. As part of preparing the address list in these mail areas the Post Office updated the mailing list. In the portion of the United States enumerated by the conventional door-to-door list and enumerate procedure, no advance mailing list was prepared. Thus, a precensus Post Office check was not possible. Since, as discussed in chapter 2, the Post Office had been successful in improving coverage in mail census areas, it was desirable to involve the Post Office in the conventional areas also.

In order for the Post Office to review the addresses in conventional census areas, the Post Enumeration Post Office Check was instituted. After the initial enumeration, the addresses listed by census enumerators were transcribed to cards and delivered to the Post Office for review. The Post Office returned cards to the Census Bureau for those households which were in their files, but not in the census address list. The Census Bureau coded these addresses to census geography, and enumerated those households which did not appear in the 1980 census records.

The Post Enumeration Post Office Check was also conducted in the South during the 1970 Census [1]. In 1970, this operation resulted in a 1.3 percent increase to the count of persons in areas enumerated under the conventional census, and a 1.4 percent increase to the housing unit count. It must be noted that in 1970 approximately 40 percent of the

population was enumerated under the conventional census-taking procedure. In 1980, the South was enumerated under the mail census-taking methodology. The results described below for the 1980 procedure are thus not directly comparable to these 1970 figures. These 1970 findings did, however, indicate that the Post Office could be effective in improving coverage in conventional census areas.

RESULTS

The results presented in this section are based on an evaluation of a sample of 1980 census records. The sample design and estimation procedures are discussed in the appendix to this chapter.

It was estimated that about 148,000 cards representing "missed" addresses were received from the Post Office. For each of these cards, the Census Bureau conducted a field followup to attempt to assign the address on the card to census geography. Those cards which were successfully assigned to census geography were compared to the census address registers to see if they had been enumerated. Those cards not found in the census address registers were subsequently revisited and enumerated. It

should be noted that Post Office cards containing lock box addresses were not processed, since it was thought that these persons should have been enumerated where they resided by the previous census enumeration procedures and these addresses could not be feasibly assigned to census geography. A summary of the results of the 1980 census processing of the 148,000 Post Enumeration Post Office Check cards is shown in table 39, below.

From table 39, it can be seen that about 50,000 housing units were added to the 1980 census from the Post Enumeration Post Office Check,(those housing units enumerated as occupied or vacant). This represents about 0.68 of one percent of the housing units in conventional census areas. Assuming that the average household size in these housing units was approximately 2.56 persons per housing unit, it can be estimated that approximately 130,000 persons were subsequently enumerated in these housing units.

The enumeration status of the 49,000 addresses that could not be assigned geographic codes by census followup is undetermined. The perception of an address can vary between Census Bureau

Table 39. Post Enumeration Post Office Check Address Cards by 1980 Census Enumeration Status

| Final census enumeration status of Post Office address cards from post enumeration Post Office check | Estimated number of cards | Standard error of Estimated numbers |
|--|---------------------------|-------------------------------------|
| Total..... | 148 223 | 36 700 |
| Enumerated as an occupied housing unit after census followup..... | 40 783 | 6 700 |
| Enumerated as vacant after census followup..... | 9 423 | 3 600 |
| Found to be for a group quarters living unit after census followup (not enumerated)..... | 2 973 | 2 700 |
| Found to be for a Postal Lockbox Address..... | 13 554 | 4 000 |
| Not geocoded by census followup..... | 48 922 | 7 000 |
| Followup status not resolved..... | 23 514 | 5 800 |
| Found to be nonexistent..... | 9 054 | 2 900 |

and Post Office employees, particularly in rural areas. These addresses could have been enumerated, but simply at an address that the Census Bureau had listed differently from that commonly used by the Post Office.

The Post Enumeration Post Office Check was estimated to have cost about \$990,000. Thus, it cost about \$19.70 to add a housing unit from this operation. The greatest portion of this expense was the field geocoding and enumeration operations which cost approximately \$530,000.

CONCLUSIONS

The Post Enumeration Post Office Check used in the 1980 Census added about

0.68 of one percent of the housing units in conventional census areas. This was not as effective as the Advance and the Casing and Time-of-Delivery Post Office Checks. Furthermore, the Post Enumeration Post Office Check was not as effective in 1980 as it was in the 1970 Census. However, the 1970 operation was conducted in the rural south which was enumerated under the mail census during 1980.

The Post Enumeration Post Office Check also cost more per added address than the Post Office Checks in mail census areas. In planning for the 1990 census, the Census Bureau is investigating means of improving the Post Office participation in the updating of census address files, particularly in rural areas.

REFERENCES

- [1] United States Bureau of the Census, Census of Population and Housing: 1970, Evaluation and Research Program PHC(E)-6, *Effect of Special Procedures to Improve Coverage in the 1970 Census*, 1974.
- [2] Whitford, David, Unpublished Census Bureau Internal Memorandum, *Post Office Effectiveness Study Documentation*, May 18, 1982.
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Appendix 14. Sample Design, Estimation, and Evaluation Methodology

SAMPLE DESIGN

For the 1980 Census, there were 36 District Offices which conducted the conventional door-to-door list and enumerate census. These are described as stratum VI in the appendix to chapter 2. For this evaluation, a simple random sample without replacement of 9 of these district offices was selected. The 1980 census materials for these district offices were saved for this evaluation.

A second stage sample was selected within each of the nine sampled district offices. This sample consisted of a sample of enumeration districts. As described in the other chapters of this report, an enumeration district respected all census boundaries, and was designed to contain between 300 and 600 housing units. This second stage sampling was done sequentially, until 68 enumeration districts were

sampled that contained Post Enumeration Post Office Check materials.

ESTIMATION

To obtain an estimate of any characteristic total, \hat{Y} , the following estimator was employed:

$$\hat{Y} = \sum_{j=1}^9 \frac{N_j}{n_j} y_j$$

where,

N_j denotes the total number of enumeration districts in the j^{th} district office.

n_j denotes the number of sampled enumeration districts in the j^{th} district office.

y_j denotes the unweighted total of the

characteristic of interest in the j^{th} sample enumeration district.

Variances were estimated using a complicated methodology which is beyond the scope of this document. Documentation of this estimator may be found in [2] and [3].

EVALUATION METHODOLOGY

The evaluation methodology was based on a clerical review of the Post Office address cards that were available from the sampled enumeration districts. The cards were examined to determine if they had been successfully geocoded during the 1980 census. Cards that were found to be geocoded were matched to the appropriate census address records. The enumeration status data given in the section "Results," was derived from the matched records.

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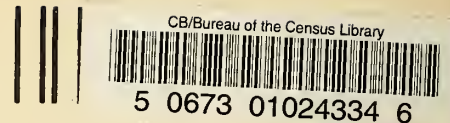
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